

660
JULY 1949

Chemical Industries

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REFINED POTASH SALTS MADE
ON TONNAGE SCALE—p. 46

Cover: Potassium Sulfate Control Station

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2
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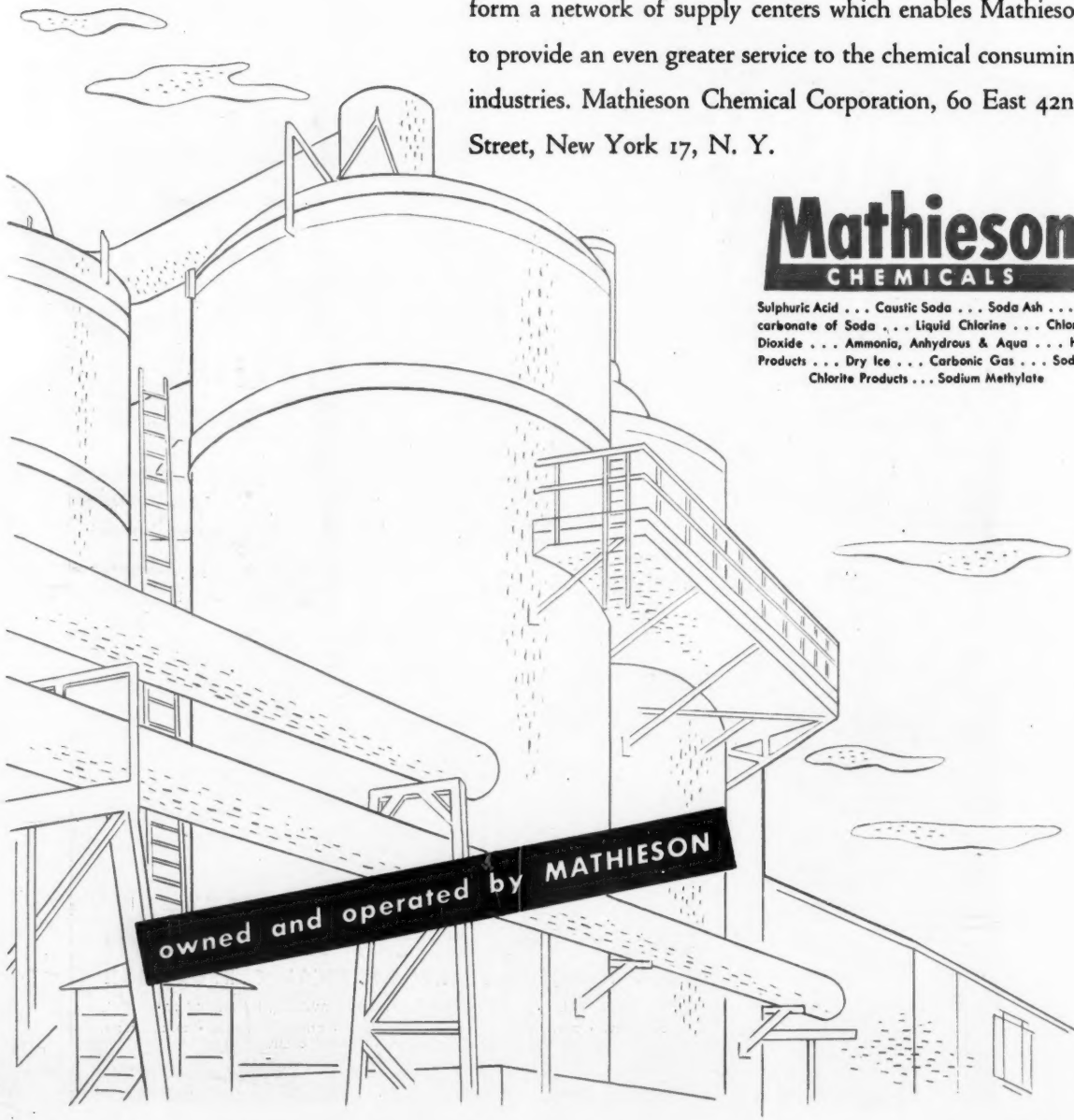
With the acquisition of Standard Wholesale Acid and Phosphate Works, and Southern Acid & Sulphur Company, Inc., Mathieson now operates the *two largest single-unit sulphuric acid plants in the world*... adds another basic product to its growing list of industrial chemicals.

With other strategically located producing units, these plants form a network of supply centers which enables Mathieson to provide an even greater service to the chemical consuming industries. Mathieson Chemical Corporation, 60 East 42nd Street, New York 17, N. Y.

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Chemical Industries

Vol. 65, No. 1

JULY 1949

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

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A MACLEAN-HUNTER publication, Horace T. Hunter, President

July

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Plasticizer OF THE MONTH

DI-ISO-OCTYL PHTHALATE

Molecular Weight 390
Boiling Range 230-239°C @ 4mm
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THE READER WRITES

Pig Instead of Pie

To the Editor of Chemical Industries:

Tell "Doc" that ten or fifteen years ago at the University of Illinois they were coming out of Speed's classes reciting "make every pig bigger." For midwestern students, predominantly masculine, I think pig is more sensible than pie.*

JANET VERNON, Chemistry Librarian
University of Notre Dame
Notre Dame, Ind.

We still say it was pie in our day, but we can't argue with Miss Vernon's logic.
—"Doc."

Can't Afford Luxury of Being a Chemist

To the Editor of Chemical Industries:
I will no longer need your publication.

Chemistry has become a hobby which I can no longer afford.

*In his "From Where We Sit" column in the May issue "Doc" recalled that Illinois' famed "Speed" Marvel used to teach students to remember the hydrocarbon radicals, methyl, ethyl, propyl and butyl, by the mnemonic injunction: "Make every pie better."

If your organization could do something to improve the salaries of chemists so that smart men would stay chemists you would perform a good deed.

LAMBERT VAN ROY
Menasha, Wis.

P.S.: Mr. Van Roy is now in the construction business.—Ed.

What's Ahead for Alkalis

To the Editor of Chemical Industries:

I have read Mr. Zabel's article "What's Ahead for the Alkali-Chlorine Market" in your June issue.

He is to be congratulated for what I believe to be some very farsighted thinking, and I feel that his comments' are most appropriate and well timed.

THOMAS S. NICHOLS, President
Mathieson Chemical Corp.
New York, N. Y.

To the Editor of Chemical Industries:

It is surprising that Mr. Zabel's article "What's Ahead for the Alkali-Chlorine Market" should contain so much commendable material on the future and still

contain such an inaccurate statement as to the present. I am referring to the sentence, "It doesn't take a very long haul to add 25% to the cost of caustic which usually sells for as little as forty dollars per ton." The current price for caustic soda is \$48 per ton, and we know of no weakening of this price situation. Since Mr. Zabel is referring to freight and its importance with respect to price, he may mean to say that freight equalization by the producer may result in a net return to him of "as little as \$40 per ton." In a few isolated cases this would be true.

In his cost estimate for soda ash Mr. Zabel reports a consumption of 1.1 tons of salt per ton of product. While the theoretical consumption would be 1.1 tons, the ammonia-soda process gives a rather poor yield, amounting to about 70 to 73% of theory, resulting in a salt consumption near 1.6 tons per ton of soda ash.

It is interesting to reflect a bit on the working of the Law of Supply and Demand in the caustic-chlorine industry during the past two decades. Previous to 1927, chlorine had been selling at \$80 per ton, and the producers were disposing of their by-product caustic, which was not of very good quality, by selling it below the current lime-soda market price. About 1927 a large lime-soda producer started making chlorine, and in a relatively few months the price fell \$20 a ton. Depression conditions forced the price of chlorine by January, 1931, down to \$35 a ton, or 56% below the 1927 price.

Meanwhile the price of caustic soda had dropped only about 4%.

It is now quite apparent that this very sharp reduction in the price of chlorine greatly expanded its use, and was, in fact, a crippling blow to the lime-soda business.

At present the prices of chlorine and caustic are essentially equal. I am told that in all other parts of the world chlorine sells appreciably higher than caustic. The Law of Supply and Demand is a powerful force, and it is likely that the ratio between chlorine and caustic prices will move back toward that which existed in 1927.

DWIGHT R. MEANS
Columbia Chemical Division
Pittsburgh Plate Glass Co.
Pittsburgh, Pa.

Lithcote Linings

To the Editor of Chemical Industries:

In your article "McCarthy Operates" on page 771 of your November, 1948, issue, you say that 150 heated Heresite-lined tankcars are to be used for shipment of formaldehyde by McCarthy Chemical Co.

While the 150 cars is correct, only 50 of these are Heresite-lined and 100 have been lined with our product, Lithcote.

C. M. JEKOT, Chief Chemist
Lithgow Corp.
Chicago, Ill.

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THREE MILES DOWN

With oil wells now drilled to constantly greater depths, the problem of corrosion fatigue, with possible loss of the drill string, assumes increased importance. Corrosion occurs in all drilling operations, but in shallow wells "twist offs" are infrequent and are easily remedied. In fields such as the Permian Basin of West Texas, however, the wells are deep and the formations encountered are hard. Here control of drill string corrosion involves savings running into thousands of dollars. "Twist offs" generally occur deep in the well and force a complete shutdown of the operation while the broken section is fished out.

These costly delays are greatly reduced, or eliminated entirely, when Sodium Bichromate is used. No other chemical has proven so effective in reducing drill string failures caused by corrosion.

The above is but one of many applications for Chromium Chemicals in the petroleum industry. Send for Mutual's Serial Number 55, a booklet which describes these uses.

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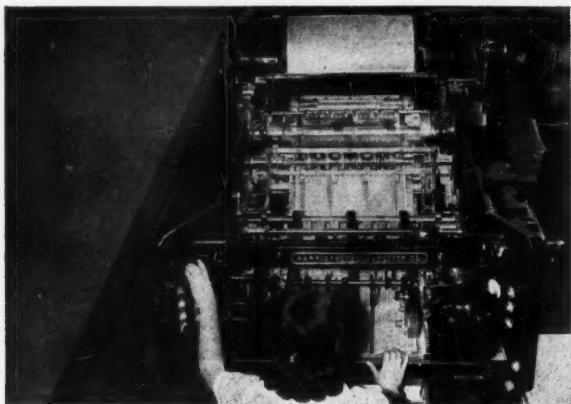
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Life ...on the

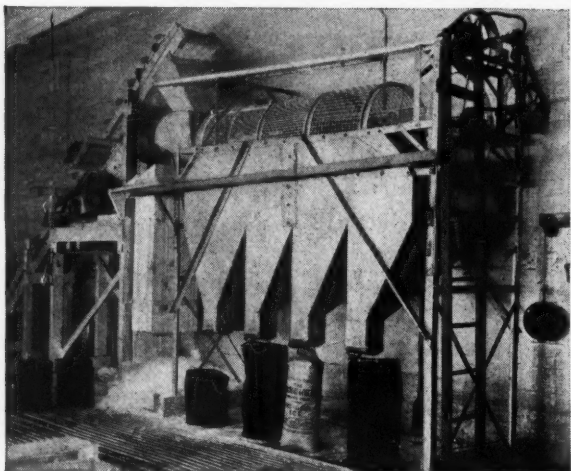


THREE QUARTERS OF A MILLION POUNDS of dry dextrin is used annually in the adhesive for U. S. postage stamps. A warm concentrated water solution of the adhesive is applied to the back of freshly printed postage stamps and dried in a single operation, following which they are fed into a perforating machine, shown above. Adhesives for labels, gummed tapes, envelopes also require remoistening properties, yet must have low hygroscopic characteristics so they will not pick up moisture and cause undesirable sticking. Cyanamid's dicyandiamide offers the adhesive manufacturer many superior properties as a fluidifying, stabilizing and rewetting agent for starch adhesives. A technical bulletin on the use of dicyandiamide in starch products is available on request.

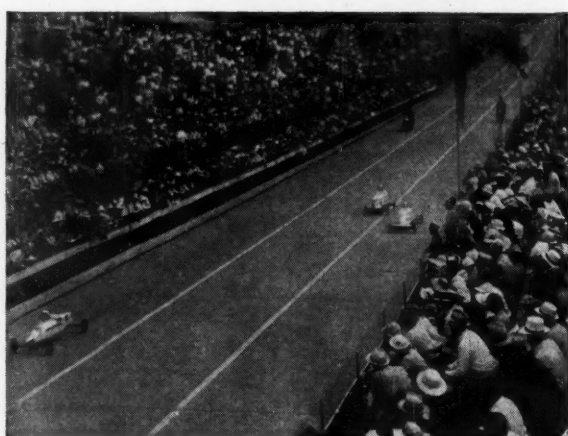


PROTECTION OF PRODUCTS against damage and losses through insect infestation is an important subject of chemical research. In this field, Cyanamid offers a full line of fumigants for control of insects in food processing and storage plants. Included are AERO* Liquid HCN, Fumigant, CARBACRYL* Fumigant and CYANOGAS® G-Fumigant. Photo shows automatic application of CYANOGAS G-Fumigant to stream of grain on its way to elevator bins. It is estimated that this low-cost method controls insects in grain at less than $\frac{1}{4}\epsilon$ per bushel. If you are seeking efficient methods of insect pest control, get in touch with Cyanamid's Insecticide Department for recommendations and suggestions based on wide experience in this field.

*Trade mark

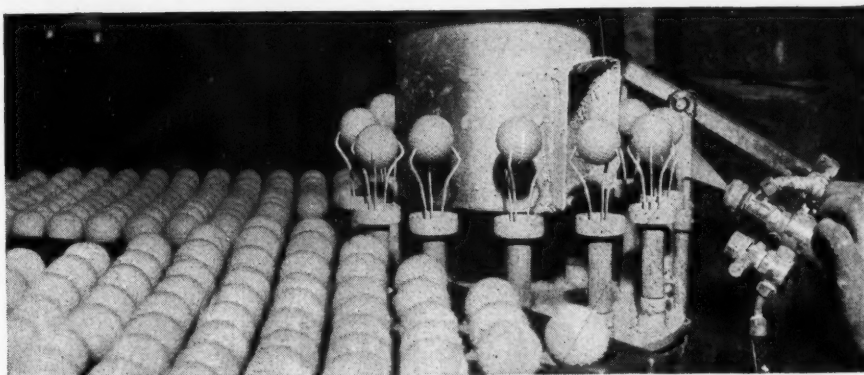


ICE IS BIG BUSINESS. In spite of the increasing use of automatic refrigeration in the home, approximately 52,000,000 tons of manufactured ice is sold each year in this country. And big news for the commercial ice and refrigeration industries has been the remarkable cost savings made possible through use of FILT-R-STIL® Water Demineralizers. In most cases, use of demineralized water has eliminated core pulling completely, cut freezing time, and lowered brine temperatures. This application of Cyanamid's Ion Exchange Resin process for producing large quantities of mineral-free water for commercial and industrial use is another interesting example of its practical value in cutting costs and improving the end product.



NO GAS OR OIL PROBLEMS confront the contestants in the 12th annual Soap Box Derby held this August where the youngsters will "drive" home-made replicas of modern racing cars on the long down-hill run at Derby Downs, Akron, Ohio. Nor does the modern motorist have to worry about engine lubrication as long as he is properly supplied with the new additive motor oils. A major supplier of chemical additives to the petroleum industry, Cyanamid's Petroleum Chemicals Department has announced AEROLUBE® 70, a new all-chemical oxidation and corrosion inhibitor type additive. Undiluted with the usual carrier oil, AEROLUBE 70 is a concentrated product offering many advantages in the compounding of motor oils and various industrial lubricants. For complete data, send for booklet on AEROLUBE 70 All-Chemical Additive. The coupon is for your convenience.

Chemical Newsfront



GOLF BALLS are given a coat of paint in a special machine shown that insures even application to all surfaces. And golf balls owe their brilliant white to the most universally used of all white pigments . . . Titanium Dioxide. To manufacturers of inks, papers and a host of other products, as well as paints, lacquers and enamels, Cyanamid, through its Calco Chemical Division, supplies **UNITANE®** (Titanium Dioxide) in both the Rutile and Anatase types. If you use Titanium Dioxide in either type, you will find helpful technical data available for the asking. Just return the coupon.



33 TO 50% FASTER BAKING TIME FOR FOUNDRY CORES is reported when Cyanamid Cycor® 151 Dry Resin Binder is used. In addition, baking temperatures of only 350° F. are required—permitting important savings in fuel. Cycor 151 is a new synthetic resin product which may be modified or extended to meet individual foundry practice requirements. It has good collapsibility, eliminates expensive cleanouts and its use produces clean, uniform castings. Use the convenient coupon to secure further particulars on this new Cyanamid product.

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- ☐ FILT-R-STIL Water Demineralizers
- ☐ UNITANE Titanium Dioxides for

- ☐ AEROLUBE 70 (type of use) All-Chemical Additive
- ☐ CYCOR 151 Dry Resin Core Binder

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Form	Granules
Odor	Moderate aromatic
Acidity (as Phthalic Acid), %	0.10 Maximum
Saponification Number	335-345
Melting Point, °C.	62-65
Containers	Fibre drums containing approximately 230 pounds net.

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(Diisooctyl Phthalate)

Color	Clear, 100 Hazen Maximum
Form	Liquid
Odor	Characteristic
Acidity (as Phthalic Acid), %	0.01 Maximum
Specific Gravity, 20/20° C.	0.984 ± 0.005
Saponification Number	280-290
Cloud test for water	Clear at 0° C.
Containers	50-55 gal. non-returnable steel barrels.

BARRETT
"ELASTEX"
50-B PLASTICIZER

Color	Clear, practically water-white (50 Hazen maximum)
Form	Liquid
Odor	Mild Ester
Distillation at 5 mm. Hg, °C.	189-222
Specific Gravity, 25/25°C.	1.076
Pounds per Gallon at 25°C.	8.95
Refractive Index at 20°C.	1.5071
Viscosity, Centipoises	467 at 5°C., 87.0 at 25°C., 22.8 at 50°C.
Containers	50-55 gal. non-returnable steel barrels.

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by Dr. M. R. McCorkle, Use Research and Development Laboratory, Armour and Company

REACTION OF Fatty Amines WITH ACIDS

New uses are being sought for the large number of organic acids of various types that are now available. Perhaps one answer will be found in the reaction products of these acids with fatty amines. The fatty amines offer an excellent means of introducing long alkyl chains into compounds containing acid groups.

Fatty amines react with almost all acids, organic or inorganic. They bring to the product normal aliphatic hydrocarbon chains from 8 to 18 carbon atoms.

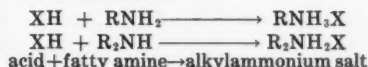
in length. Unsaturated hydrocarbon radicals can be incorporated by the use of unsaturated fatty amines.

Where heavy fat-loading is required, the secondary fatty amines carrying two fatty alkyl chains per molecule are used. The Armeens offer a wide range of fatty amines for this purpose.

Reactions

The neutralization reaction of fatty amines with acids yields substituted

ammonium salts.



The alkyl ammonium salts show many interesting properties in themselves. Many are cation active and they are water and/or oil-soluble depending on the acid and fatty amine used.

The above neutralization products, if of organic carboxylic acids, may be dehydrated by heating to produce N-alkyl acid amides.

The following Tables show representative products of this type and their properties. A large number of similar products are possible.

Synthetic Wax-Like Products

Synthetic Wax Formed	F. P.	Needle Penetration 50 gms./25°C.	Raw Materials	Pounds Used	Conditions
Armeen 18D Stearate	80° C	5.0	Armeen 18D Stearic Acid (Neo-Fat 1-65)	50.8 49.2	*
Armeen 18D Stearamide	87° C	11.0	Armeen 18D Stearic Acid (Neo-Fat 1-65)	50.8 49.2	**
Armeen 2HT Stearate	83° C	7.0	Armeen 2HT Stearic Acid (Neo-Fat 1-65)	64 36	*
Armeen 2HT Stearamide	76° C	8.0	Armeen 2HT Stearic Acid (Neo-Fat 1-65)	64 36	**
Armeen 2HT Adipate	81° C	1.0	Armeen 2HT Adipic Acid	87.5 12.5	*
Armeen 2HT Adipamide	74° C	17.0	Armeen 2HT Adipic Acid	87.5 12.5	**
Armeen 2HT Phthalamide	40° C	12.5	Armeen 2HT Phthalic anhydride	87.5 12.5	**
Armeen HT Adipamide	134° C	13.0	Armeen HT Adipic Acid	81 19	**
Paraffin (for 125° F (52° C) comparison) 139° F (59° C)		17.0 10.0			

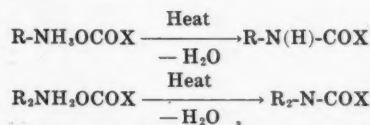
*Mix at melting point.

**Mix and heat to 220° C.

Solubilities—(grams per 100 grams of solvent)

	VMP Naphtha 25° C.	∞	M. E. K. 25° C.	∞	M. Cellosolve 25° C.	∞	Ethanol 95% 25° C.	∞	Trichlor ethylene 25° C.	∞
Armeen 18D Stearate	.14	∞	.28	∞	.39	∞	.31	∞	.48	∞
Armeen 18D Stearamide	.23	∞	.17	∞	.32	∞	.24	∞	.62	∞
Armeen 2HT Stearate	.16	∞	.23	∞	.47	14.3	.33	∞	.72	∞
Armeen 2HT Stearamide	.90	∞	.56	∞	.31	6.4	.50	∞	2.09	∞
Armeen 2HT Adipate	.08	∞	.28	∞	.61	∞	.78	∞	.93	∞
Armeen 2HT Adipamide	1.50	∞	.78	∞	.60	2.0	.4	6.4	2.36	∞
Armeen 2HT Phthalamide	2.62	∞	4.40	∞	.60	6.5	.75	2.9	104.7	∞

*At B. P. of solvent or M. P. of wax whichever is lower.



alkylammonium → N-alkyl acid amide carboxylic acid salt

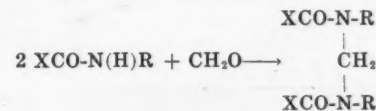
The N-alkyl acid amides are neutral, water-insoluble, oily or waxy products.

Synthetic Waxes

A good example of the above type of reaction is the use of fatty amines to produce synthetic waxes. For this purpose solid acids and high molecular weight saturated fatty amines are used. The acid and amine are merely mixed at a temperature above the melting point of the product to give the alkylammonium salt. Heating the salt at 220°C results in dehydration to the corresponding N-alkyl amide.

Condensation With Formaldehyde

Many of the N-alkyl acid amides formed from primary fatty amines by the above reactions can be further condensed by reaction with formaldehyde to form methylene bis amides.



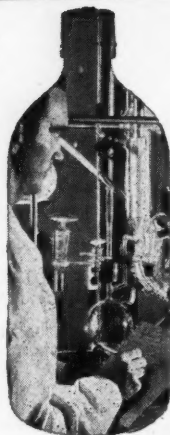
The reaction is carried out by heating the amide with paraformaldehyde in the presence of a small amount (0.1% of phosphoric acid) of catalyst. Products are usually high melting, waxy solids.

Write for free booklet, "Armeens, RNH₂, Organic Alkalis From Fats," showing the Armeens available to you. Also available free is the booklet, "Chemistry of Fatty Amines."

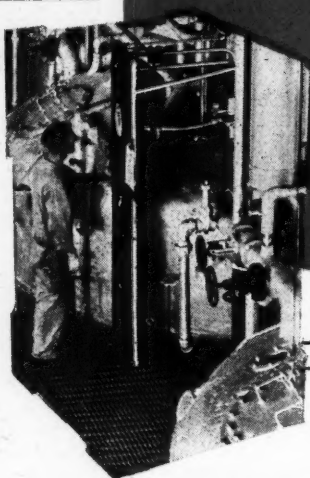
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With B&A, you can be certain of receiving products which *always meet the strictest standards of the chemical profession*. Ton after ton, year after year, their purity consistently exceeds that specified for careful analytical work by the American Chemical Society. That's because exacting quality control governs every step in producing B&A "C.P." Acids.

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B&A's "C.P." Acid producing facilities are located in industrial centers from coast to coast. In addition, extensive stocks are carried in its nation-wide chain of distributing stations . . . a combination that assures you of a reliable source for purity products at all times. For your needs, phone or write any B&A office below.

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GENERAL CHEMICAL DIVISION

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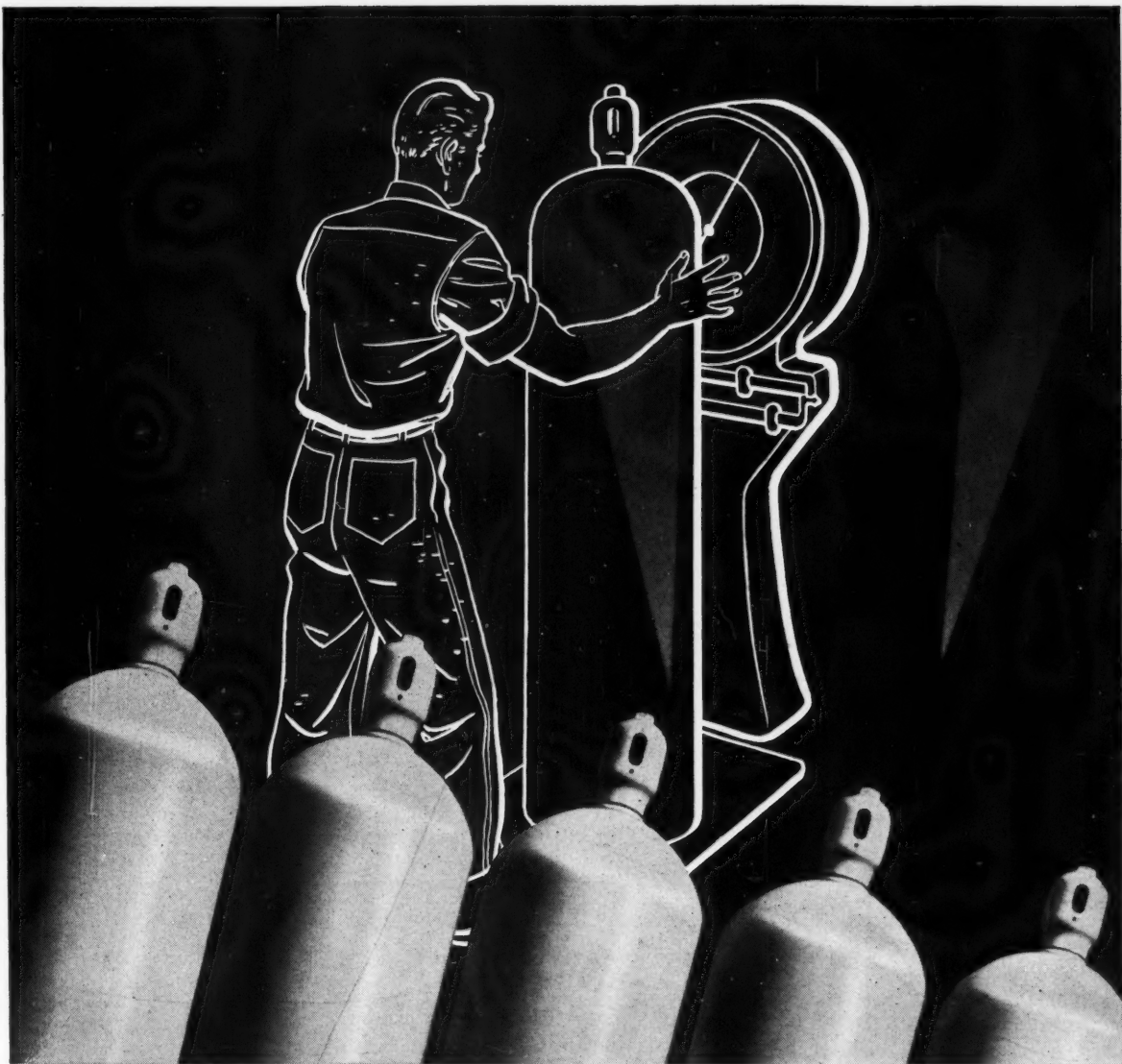
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Write for full details



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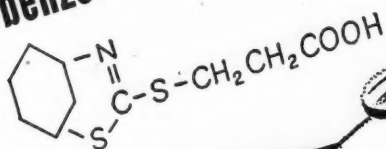
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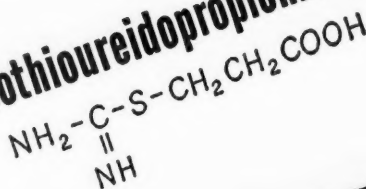
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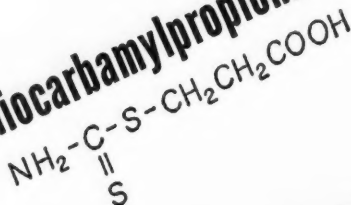
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Investigate these new nitrogen- and sulfur-containing organic acids—as acids or as intermediates for esterification and salt formation.

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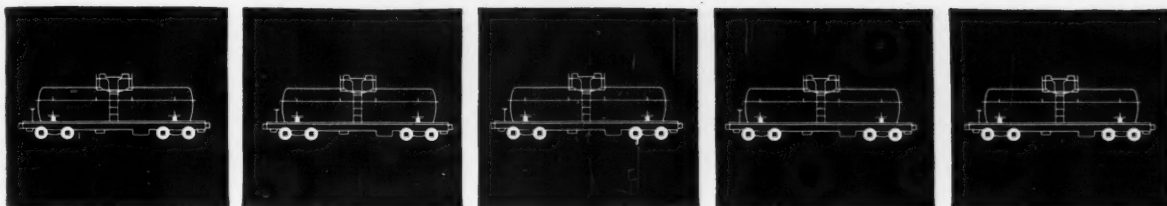
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Recently completed facilities have enabled us to double our previous production of Mercury Cell Caustic. If your chemical needs include quality caustic soda, why not write us today?

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908-4

U.S.I. CHEMICAL NEWS

July ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1949

Versatile Pyrenones Give Unusually Wide Range of Pest Control

Highly Effective In
Many Important Fields

From restaurant kitchens to huge grain warehouses, many of the most important and varied types of pest control problems are now being solved by U.S.I.'s Pyrenones. Combining unusual safety and effectiveness against a wide range of insects, their use is extending to many vital areas of pest control.

Proven inherently non-toxic to warm-blooded animals in three years of exacting tests, Pyrenones can be used safely on crops while they are growing, in warehouses where food is stored, in plants where food is processed, and in restaurants or homes where food is prepared for eating.

Protect Stored Grain and Grain Products

Pyrenone-type insecticides offer safe, long-lasting control of such grain insects as confused flour beetles, cadelles, grain borers, moths, and the yellow meal worm. For this reason, Pyrenones are highly effective in protection of stored grain or grain products in mills and warehouses, in ships' holds, in grain elevators, in grain box cars, and in interiors of farmers' grain bins.

Valuable Where Food Is Processed Or Prepared

In the important food processing industry, Pyrenone's combination of safety and effectiveness is particularly welcome. Insecticides containing Pyrenones quickly kill the

MORE

New Flat Plastics Lens Is Revolutionary Advance

A new, thin, flat plastics lens, described as revolutionary in the optical field, reportedly weighs only about one-tenth as much as a glass lens. It is cheaper to produce, and yet will magnify, focus, and in other respects perform just like a conventional glass lens, the makers assert. The new-type lens is said to derive its magnifying power from the fact that its apparently flat surface is molded into a series of small concentric grooves which refract light in the same way as does the unbroken curve of a glass or oil-filled plastic lens.

The lightness of the flat plastics lenses permits field lenses of very large area, and their thinness almost eliminates spherical aberration, according to the manufacturers. While not precise enough for the picture-taking lens of a camera, the new-type lens is expected to find wide use as a television magnifier, a production-line inspection lens, a slide-viewer lens, etc.

Makes Paper from Straw

Paper can now be made from almost any kind of straw, it is claimed, using a new chemical process. The individual straw fibers are reportedly broken apart without reducing their length.

17-Mile Channel Turns Land-Locked Harbor Into Excellent Port

Distribution Center for Hydrocarbon Synthesis Chemicals Will Have Access to Fine Facilities for Shipping by Water or Rail

Located at the Port of Brownsville, Texas—the youngest of all ports of major importance—U.S.I.'s new distribution center for hydrocarbon synthesis chemicals will have available the latest in docking, cargo-handling, and other shipping facilities. The port is an artificial harbor which has been connected

with the Gulf of Mexico by a 17-mile, straight and unobstructed sea-level channel. The port's facilities include up-to-date docks, the latest in fireproof general cargo wharves, and modern freight and cargo handling machinery.

Construction of the hydrocarbon synthesis plant of Carthage Hydrocol, Inc., the chemical separation and refining plant of Stanolind Oil and Gas Company, and U.S.I.'s chemical storage, compounding and distribution center, is progressing rapidly and should be completed by the end of 1949. U.S.I. will distribute to industry or to its own plants all of the water-soluble oxygenated co-products of the hydrocarbon synthesis process.

New Docks Being Built

In addition to the fine docking facilities already existing at the port, a new 500-foot oil dock is being constructed for Carthage Hydrocol, and adjoining this, special docking facilities for the U.S.I. distribution center will be installed. The fact that transport by rail, barge, or cargo ship is so readily accessible to U.S.I.'s new Brownsville establishment helps assure U.S.I. customers of a dependable and continuous supply of the important alcohols, aldehydes, ketones, and acids to come from the hydrocarbon synthesis.

Low-Octane Motor Fuels Fortified with Alcohol Equal Regular Gasoline

A truck fueled in recent tests with 58-octane gasoline plus periodic injections of alcohol and water is said to have operated as well as it would on regular gasoline having an octane rating of 74 or better.

Researchers reveal that during at least 80 per cent of normal driving, when a car is running on the level at speeds up to about 40 miles per hour, the engine will run satisfactorily on gasoline of 50-octane number or even lower. For this reason, much of the anti-knock quality of ordinary gasoline—74-octane or better—is in effect wasted. On the other hand, during acceleration, hill-climbing, and in general whenever the engine is working hard, a relatively high-octane fuel is required. Injection then of alcohol-water mixture into the carburetor can provide the needed anti-knock quality, increasing the effective octane number of gasolines by as much as 20 octane units, it is claimed.



Air view of Port of Brownsville, showing the harbor in the foreground and looking east along the 17-mile sea-level ship channel that connects it with the Gulf of Mexico. In the background, just to the left of the point where the harbor narrows into the channel, can be seen the site and the partly completed structures of the plants of Carthage Hydrocol, Stanolind, and U.S.I.

July

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U.S.I. CHEMICAL NEWS

*

1949

New Fatty Acid Separation

Fatty acids can be separated from soybean, corn, and other vegetable and animal oils by fractional crystallization from acetone, followed by continuous vacuum filtration, a recent patent states. Chilling of the acetone solution causes formation of a two-phase mixture, according to the patent, with the fatty acids to be separated in the solid phase. Then, in a continuous cycle, filtration, washing, and drying are carried out in a vacuum-drum filter, and separation of unsaturates from saturates is claimed to be practically complete. Further separation of stearic from palmitic acid is also said to be possible.

Bone Cancer Is Treated With Radioactive Gallium

Bone cancer can now be attacked directly, a Navy medical man reports, by a radioactive isotope known as gallium-72. The gallium isotope has been tested on mice and dogs, and was recently approved for use on selected human cancer cases, the medical man revealed.

CONTINUED

Versatile Pyrenones

chocolate moth, cheese mites and skippers, fruit flies, silver fish, and cockroaches — yet they create no toxicological hazards.

Similarly, in the home and in restaurants where food is prepared for human consumption, Pyrenones give safe control of these insects, as well as other, common insects like houseflies, fruit flies, gnats, mosquitoes, ants, spiders, and bedbugs.

Controls Insects Attacking Dairy Cows, Range Cattle

Dairymen and cattle ranchers are getting outstanding insect control using a variety of Pyrene-based formulations — water emulsions, oil-type sprays, dips, dusts, or wettable powders. Treated cows are healthier and give more milk; treated range cattle show sizeable weight gains, and there is no danger of contamination of meat or milk products by the insecticide.

Develops New Rocket Fuel Using Liquid Hydrogen

Using liquid hydrogen cooled to $-423^{\circ}\text{F}.$, researchers have developed a new rocket fuel that generates an exhaust which travels at a speed of 15,000 miles per hour, it is claimed. The university laboratory which developed the fuel has built a motor the size of a man's hand to burn the fuel, it is reported.

Sulfa Drug Damage Is Minimized by Methionine

The sulfur amino acid methionine prevents damage to the thyroid in rats caused by prolonged sulfadiazine intoxication, according to a report made recently in a medical publication. DL-Methionine is now being produced in quantity by U.S.I. to meet the increased demands of the pharmaceutical and feed industries.

Domestic Coal Can Supply High-Grade Montan Wax

Domestic coal sources could be exploited to supply large quantities of high-grade montan wax, recent investigations have shown. Montan wax was formerly imported from Germany, for use in carbon paper, insulation, and many other products.

Subject Index of Reports On European Technology

A new subject index and abstract collection of over a thousand unclassified scientific and technical reports, prepared by a special committee and dealing with European technology, is available now.

TECHNICAL DEVELOPMENTS

Further information regarding the manufacturers of these items may be obtained by writing U.S.I.

For laboratory testing of paints, inks, chemicals, etc., a small mill, said to grind, emulsify, homogenize, mix, and disperse these materials is now available. Adjustment for different grind sizes can be made without stopping and long runs are possible, the makers state. (No. 469)

A new adhesive tape for heavy packaging, said to be waterproof, and to have a tensile strength of 180-lbs. per inch of width, and a tear resistance of greater than 1600 gram-centimeters, is reported available. (No. 470)

Rust-proofing of fine instruments and other metal articles without greasing or air-tight sealing is possible now, it is claimed, simply by wrapping them loosely in chemically treated paper. (No. 471)

A flexible polyethylene pour spout for paint pails is said to be available now as an integral part of a new-type closure described as tamper-, vapor-, rust-, and leak-proof. (No. 472)

Carbonated beverages in any of six flavors can now be served, it is claimed, by dropping new, flavored tablets into a glass of water. Tablets eliminate handling of bottles and are said to take little storage space. (No. 473)

A new plastic electrical tape has a dielectric strength of over 10,000 volts plus the other electric characteristics of its parent material, polyethylene, the makers state. It is reported to be 10 times more moisture-resistant than vinyl types. (No. 474)

A high-flash-point, non-injurious solvent for removing paint, wax, grease, lube oils, or extreme pressure lubricants from skin, wood or metal surfaces is non-corrosive, according to the manufacturers. (No. 475)

Aluminum screws, machine bolts, washers, nuts, and nails are reported available now. The fasteners are claimed to resist rust when used with wood or aluminum construction, indoors or out. (No. 476)

For applying protective coating films of uniform thickness on plane surfaces, a new compact, direct reading laboratory device is said to be accurate and easy to manipulate, and to have adjustable clearance. (No. 477)

To clean and repolish floors in one operation, a new non-slip floor polish has been specifically formulated for wood floors, but is also effective for linoleum, linoleum, cork, and similar resilient floors, the manufacturers assert. (No. 478)

U.S.I. INDUSTRIAL CHEMICALS, INC.

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BRANCHES IN ALL PRINCIPAL CITIES

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Amyl Alcohol
Butanol (Normal Butyl Alcohol)
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Ethanol (Ethyl Alcohol)

Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof, C.P. 96%, Absolute

*SaloX—proprietary solvent

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*Super Pyro Anti-freeze

U.S.I. Permanent Anti-freeze

*ANSOLS

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Amyl Acetate
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OXALIC ESTERS

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PHTHALIC ESTERS

Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate

OTHER ESTERS

*Dialol
Diethyl Carbonate
Ethyl Chloroformate

INTERMEDIATES

Acetoacetanilide
Acetoacet-ortho-anisidide
Acetoacet-ortho-chloroanilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloroanilide
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Sodium Oxalacetate

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Ethyl Ether, U.S.P.
Ethyl Ether Absolute—A.C.S.

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Riboflavin Concentrates *Vacatone 40
*Curbay B-G *Special Liquid Curbay
DL-Methionine

ACETONE

Chemically Pure

RESINS (Synthetic and Natural)

*Aroplaz—alkyds and allied materials
*Arofen—pure phenolics
*Arofen—modified types
Ester Gums—all types
Congo Gums—raw, fused & esterified
Natural Resins—all standard grades

INSECTICIDE MATERIALS

CPR Concentrates
Piperonyl Butoxide
Piperonyl Cyclonene
*Pyrene Concentrates
Pyrethrum Products
Rotenone Products

INSECTIFUGE MATERIALS

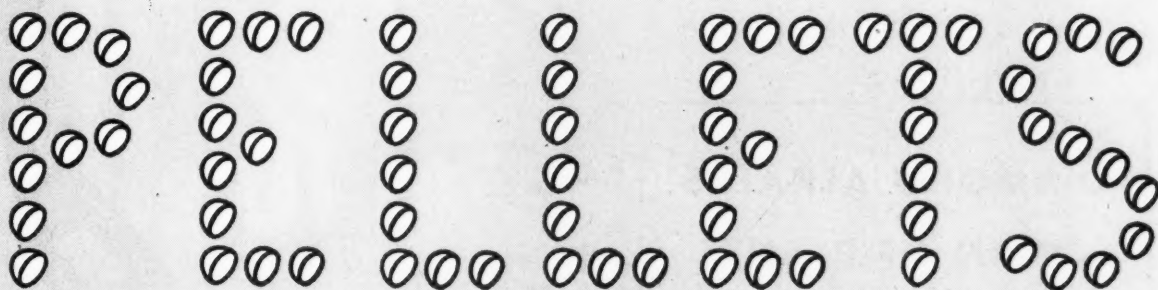
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- free from dust ● extremely pure



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- Baker's SODIUM HYDROXIDE - Baker's POTASSIUM HYDROXIDE

If you use Sodium or Potassium Hydroxide in C.P. or U.S.P. grades—Baker's Pellets may simplify your handling problems. They're easier to weigh—safer and more convenient to use—higher in chemical purity.

Baker's Hydroxides are always pure white, and extremely low in heavy metals and other impurity items—such as chloride, sulphate, phosphate, nitrogen, silica.

They will appeal to manufacturers of plastics, fine soaps, cosmetics, and drugs—photo-

engravers and electroplaters—and leaders of numerous other industries who find that high purity hydroxides serve to reduce overall production costs.

Baker's high quality standards are offered at no price premium. If you are interested in either Sodium or Potassium Hydroxide in C.P. or U.S.P. grades, write for samples and prices of Baker's Pellets.

Address: J. T. BAKER CHEMICAL CO.,
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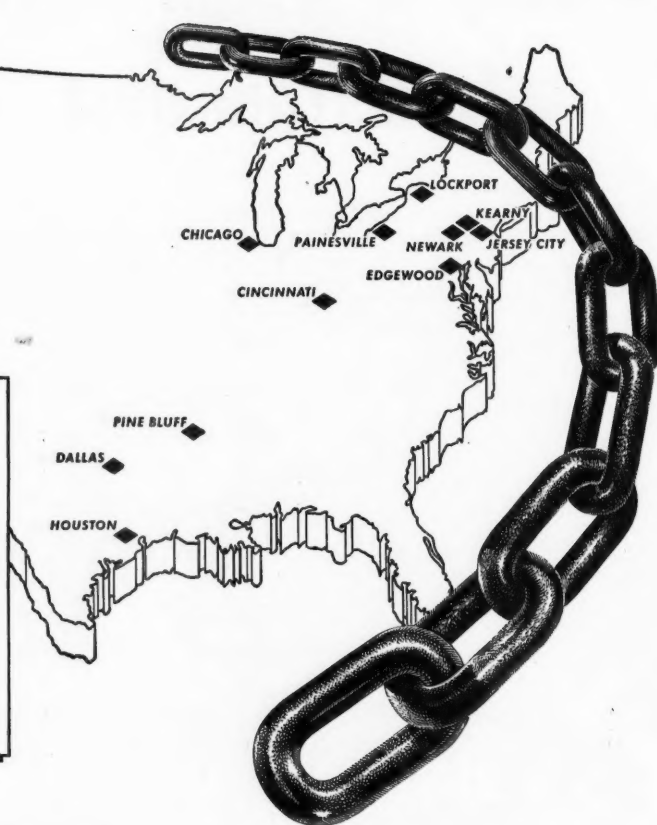


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58% Light Soda Ash
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Carbon Tetrachloride, Tank Cars
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(Resinous Chlorinated Paraffin)
Chlorowax 40
(Liquid Chlorinated Paraffin)
Dry Cleaning Solvents

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Chromate of Soda
Bichromate of Potash
Tanning Salts
Tanning Extracts

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All Grades, Water White 42°
Silicate of Soda, Glass
Silicate of Soda, Concrete Special
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Precipitated Calcium Carbonate
Pigments for Paint, Rubber,
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Millical
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Surfex
Surfex MM
Multifex
Multifex MM
Super Multifex
Kalite

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THE LAUNDRY INDUSTRY**

Laundry Soda (Modified Soda)
Diamond Soda Crystals
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AND BEVERAGE INDUSTRIES**

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Diamond Soda Crystals
(Sesquicarbonate of Soda)
Special Alkalies (Causticized Ash,
all strengths)
High Test Alkali Flake
(Bottle Washing)
Diamond Detergent
Hydrolate
Hydrobreak
All-Purpose W
Clipper Cleaner
Powdered Acid Cleaner
Compounds for specific uses

MAGNESIUM CHEMICALS

Refractory Periclase
Caustic Calcined Magnesite

MISCELLANEOUS

By-Product Alumina Hydrate
By-Product Sulphur
Chrome Salt Cake
Di-Aqua (Wetting Agent)

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HYDROFLUOSILICIC ACID

when your process requires
fluoride ions in the acid state

- 1 **More economical**-- Davison Hydrofluosilicic Acid is less expensive in bulk form than other acids containing fluorine--also lowers operating cost by eliminating the need for ventilating and temperature control equipment.
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- 3 **Easier to handle**-- Hydrofluosilicic Acid is used at room temperature. The solution is easier to control and does not deteriorate spontaneously in use.
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POTASSIUM, AMMONIUM, MAGNESIUM, ZINC and SODIUM for use wherever the following properties are required:

Weak Acid for neutralizers, fixing agents; for pH control and polymerization.

Preservative for controlling mold, mildew and algae; as fungicides, germicides and insecticides.

Fluxing in ceramics, enamels, glazes, glass and vitreous ware, concrete hardening; metal refining and casting.

Davison Hydrofluosilicic acid has many advantages over hydrofluoric acid for processes requiring the use of a fluoride ion in the acid state.

They have proved H_2SiF_6 to be a more convenient, economical, efficient material for such operations as: pickling, pre-cleaning aluminum for spot welding, bright dipping light metals, electroplating with chromium, etching light metals for adhesion of paint or corrosion resistant coatings, and other similar applications.

Product data sheets covering the properties of Davison Hydrofluosilicic Acid are available... please mention your proposed application when you write.

Write For Product Data Sheets Today

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The world's largest electrical furnaces work 'round the clock to refine Monsanto's elemental phosphorus of better than 99.9% purity.

SOURCE OF QUALITY In Phosphoric Acid and Phosphates

Monsanto phosphoric acid and phosphates are derived from Monsanto-produced pure elemental phosphorus. From this pure phosphorus, quality-controlled Monsanto processes bring

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Mono Sodium — Water treatment, textiles, acid cleaning compounds.

Di Sodium — Cheese, leather, textiles, detergents, water treatment, dye, pigments.

Tri Sodium — Water softener, detergent, metal cleaner, water treatment, textiles.

Tetra Sodium Pyro — Soap, detergents, cheese, textile dyeing, bleaching and finishing, metal cleaning, oil-drilling mud, water treatment, water softener, glass, degreasing.

Tri Poly — Soap, detergents, water softener, textile dyeing, bleaching and finishing, degreasing, metal cleaning, clay refining.

Acid Sodium Pyro — Baking powder, oil-drilling mud, electroplating.

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Mono Calcium — Baking powder, self-rising flour, prepared flour, mineral supplement.

Di Calcium — Tooth paste, tooth powder, mineral supplement, pharmaceutical.

Calcium Pyro — Mineral supplement, pharmaceutical.

Tri Calcium — Tooth paste, tooth powder, anti-caking agent, mineral supplement, pharmaceutical.

AMMONIUM PHOSPHATES

Mono Ammonium — Fireproofing, yeast, malt, plant nutrient.

Di Ammonium — Fireproofing, yeast, plant nutrient.

POTASSIUM PHOSPHATES

Mono Potassium — Pharmaceuticals.

Di Potassium — Fermentation, nutrient solutions, pharmaceuticals.

Tri Potassium — Oil refining.

Tetra Potassium — Soap, textiles, water softener.

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ENJOY the interesting story of phosphorus in "Phosphorus... The Light Bearer." Sent upon request.

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**Versatile plasticizer aids
processing, improves quality
of vinyl products**

Recently completed manufacturing facilities now assure greatly increased supplies of Santicizer* 141, Monsanto's versatile plasticizer for polyvinyl chloride and vinyl co-polymers. It is priced to compete with other primary vinyl plasticizers.

Santicizer 141's wide compatibility and strong solvent action make possible economical reductions in processing temperatures — permit broader choice of other compounding materials. It also contributes the following desirable properties to vinyl products: low-temperature flexibility, flame resistance, light stability, low volatility, resistance to embrittlement, low toxicity.

Detailed information on Santicizer 141 — and on other members of Monsanto's family of plasticizers and resins — will be sent promptly on request.



**BOOKLET
DESCRIBES
MANY
APPLICATIONS
FOR PENTA**

The industrial wood preservative

This booklet offers useful information on how Monsanto's PENTACHlorophenol can be used profitably to protect wood construction from decay and destructive insect attack.

Write for a copy of "Monsanto PENTACHlorophenol for Preserving Wood in Industrial Construction." Learn about this dependable, CLEAN, proved method of protecting your investments in wood.

Improve coating

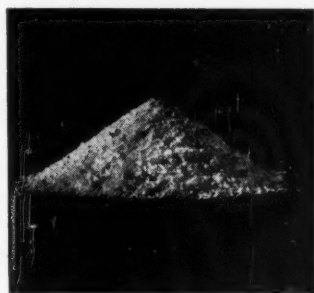
Benthal short oil high-quality. By replacing acid with it is possible to meet long the acid.

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BENTHAL

Improves quality of protective coatings at reasonable cost

Benthal* enables manufacturers of short oil modified resins to produce high-quality coatings economically. By replacing a portion of the dibasic acid with Benthal, a monobasic acid, it is possible to retard bodying, permit longer processing, thus reducing the acid value of alkyd resins.

Since Benthal becomes part of the resin molecule, it acts as an internal plasticizer — improves the flexibility and adhesion of dried films. Benthal is available for prompt shipment at reasonable cost . . . For more information on its processing advantages, send for a copy of Monsanto Technical Bulletin No. O-D-503, "Benthal Applications in Alkyd Resins."

BIOLITE

New product developed for mildew control in laundries

A new Monsanto product, Biolite, has proved highly successful as a mildew preventive. It is especially useful in laundries, and is being marketed through laundry supply houses.

Biolite is a formulation of Santobrite,* Monsanto's Sodium Pentachlorophenate, Technical. This is another new application for Santobrite, which is already used extensively for slime and algae control in industrial cooling water systems, micro-organism control in pulp and paper manufacture, weed control.

AROCLOR 1248

**Eliminates Fire Hazard
In Die-Casting Systems**

Monsanto's AROCLOR* 1248, non-flammable hydraulic fluid for metal die-casting machines, brings greater safety to the industry by eliminating the danger of fires. Economical? Of course! The cost of AROCLOR 1248 may be only half that of the fluid you now are using because of AROCLOR'S low price and low "make-up" requirement.

AROCLOR 1248 has given continuous, satisfactory service in individualized units for ten years . . . has delivered equal results in centralized systems for two years.

Look at these significant test results: AROCLOR 1248 has *no fire point*, spontaneous ignition temperature of 1,300° F. AROCLOR 1248 spray or mist requires 64% oxygen for combustion. These results establish the nonflammable and noncombustible qualities of AROCLOR 1248.

AROCLOR 1248 is noncorrosive and has such lubricating qualities that it usually is employed in die-casting systems without the addition of other lubricants. For complete details, ask for Monsanto Technical Bulletin No. P-137.

NEW TEXAS CITY STYRENE PLANT DEDICATED IN APRIL



In April, Monsanto dedicated its newly reconstructed Texas City, Texas, styrene plant.

Highlight of the dedication was a ceremony to honor the memory of 145 Monsanto employees who perished when the styrene plant was destroyed by the explosion of S.S. Grandcamp, a nitrate-laden steamer.

The new plant embodies many improvements over the old installation — is now in full-scale production.

MANY INTERMEDIATES NOW AVAILABLE FOR PROMPT SHIPMENT

**Offer wide possibilities for
product development
and improvement**

Of interest to the chemical process industries is the wide selection of Monsanto intermediates now available for immediate delivery.

Some of these chemicals may well serve as stepping stones to development of new products, or to improvement of processes presently used.

para-Aminobiphenyl • *para*-Nitrobiphenyl • *ortho*-Anisidine • *para*-Anisidine • Benzoic Acid, Technical • Benzyl Chloride • Dichloroaniline • *ortho*-Chloroaniline • *para*-Chloroaniline • *ortho*-Chlorophenol • *para*-Chlorophenol • Cyclohexylamine • Dicyclohexylamine • Dinitroaniline • Dinitrochlorobenzene, 46.5° and 48° • Monsanto Salt (*ortho*-Chlor *para*-Toluene Sodium Sulfonate) • *ortho*-Nitroaniline • *ortho*-Nitrochlorobenzene • *ortho*-Phenetidin • *para*-Phenetidin • Phenol, U.S.P. • Phenolsulfonic Acid, 65% and 70% • Sodium Benzoate, Technical • *para*-Toluenesulfonamide • *para*-Toluenesulfonchloride • Toluenesulfonic Acid

*Reg. U. S. Pat. Off.

★ ★ ★

MONSANTO CHEMICAL COMPANY, Desk E, 1703 South Second Street, St. Louis 4, Missouri. District Sales Offices: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.



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Another Celanese First!

FLAKE FORMALDEHYDE

GENERAL PURPOSE PARA FORMALDEHYDE

***NOW AVAILABLE* IN COMMERCIAL QUANTITIES
AT HALF CURRENT MARKET PRICE**

Paraformaldehyde—in flake form—is the latest Celanese research development. It is produced by an entirely new process permitting greatly lowered costs.

Flake formaldehyde has no methanol or other inhibitor present, and contains no buffering salts. Its iron content and other impurities are held to formalin specifications. Paraformaldehyde can now replace formalin in many industrial applications to give definite economic and quality advantages.

PROPERTIES AND SPECIFICATIONS

APPEARANCE	hard, pulverable flakes
FORMALDEHYDE CONTENT (% BY WT. MIN.)	91.0%
ACIDITY (% BY WT. AS FORMIC, MAX.)	0.05%
ASH (% BY WT. MAX.)	0.01%
IRON CONTENT (PARTS PER MILLION MAX.)	2
PARTICLE SIZE	passes 1/2" screen
COLOR (APHA AS 37% SOLN)	10
BULK DENSITY (APPROX.)	0.65
MELTING POINT (SEALED TUBE)	100—125°C
FLASH POINT (TAG OPEN CUT APPROX.)	200
IGNITION TEMPERATURE (APPROX.)	575°F
FLAMMABILITY	combustible solid

CELANESE* FLAKE FORMALDEHYDE (paraformaldehyde)

opens the way to new developments and improvements in the resin, rubber, textile and organic synthesis fields. This general purpose flake is a mixture of polymethylene glycols having an average degree of polymerization of ten oxymethylene groups. Its short polymer chain length indicates excellent reactivity. Its low water content (9% by wt. max.) minimizes water removal cycles and permits larger batches.

Flake formaldehyde does not dust. It promises easier handling and storage . . . no special facilities are required. It is available in 5, 25, 100 and 300 lb. Fiber Drums.

Celanese Paraformaldehyde is also available in powder form for special applications. Other types are under development. Write to Product Development Department for New Product Bulletin N-16-1, samples and other information.

CELANESE CORPORATION OF AMERICA, Chemical Division, 52-C 180 Madison Ave., New York 16



*Reg. U. S. Pat. Off.

ALCOHOLS • ALDEHYDES • GLYCOLS • KETONES • ACIDS • SOLVENTS • PLASTICIZERS

Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter,
July, 1949

For Your Information:

Oldbury Electro-Chemical Co., Niagara Falls, has a process for hypophosphorous acid that is now going into pilot plant. This will be the first time this has been offered as an industrial chemical. It is expected to be found useful in applications where the residue left by the sodium salt is objectionable.

Oldbury is also building a new 7,000 KW electric furnace to produce elemental phosphorus. Service facilities for the furnace are being made large enough to accommodate expansion up to 30,000 KW.

Shell Oil Co. will soon start to recover and sell paraffin waxes obtained from its new lube oil refinery at Houston. It has previously been charging the waxes back into its cracking operations.

* * CI * *

You can expect to hear more about a small, packaged electrolytic caustic-chlorine unit now under development by a major engineering firm.

Washington Laboratories, vitamin oil producer in Seattle, has developed to the semi-commercial stage a food preservative and fungicide made from fish oil that kills blue mold and brown rot. Tried experimentally on oranges for the past year and a half, it proved to be successful and entirely nontoxic. It is claimed to be applicable to fresh or frozen fish and vegetables.

* * CI * *

Indication of the odds on replacement by synthetic pyrethrum of the natural product: Those who control the Kenya (East Africa) flowers production--most of the world's present supply--are trying to tie consumers to two-year contracts for this two-year crop.

Air Force requirements, added to other sizeable new demands created recently, may result in reactivation of now-idle wartime magnesium plants. FWA is asking \$3 million for the purpose. Many changes are being planned in new planes to achieve reduction in weight and number of parts by using cast magnesium alloys instead of aluminum alloy sheets. Other rapidly expanding magnesium uses are Inco's new

cast iron (CI, April 1949, p. 622), magnesium dry cells, and cathodic protection. Capacity at Dow's Freeport plant (the only producer) was 20 million lbs. a year—only 5 per cent of the wartime peak—but it was doubled this spring by purchase of a duplicate unit from the Government. Complicating the stepping-up of Dow's operations, however, is a pending Department of Justice anti-monopoly suit against Dow on magnesium.

* * CI * *

Washington memos: A bill is in the Senate to extend the exemption of import duty on lead for another year. . . . No further procurement of tungsten and zinc is contemplated by the Munitions Board during this or the next fiscal year. . . . The coal inspection bill before Congress will give police powers to U. S. Bureau of Mines' inspectors to the extent of withdrawing miners from areas considered hazardous.

Dow Chemical Co.'s expanded ethylene glycol production will be based on ethylene from Polymer Corp.'s doubled ethylene capacity at Sarnia, Ont. Polymer will spend \$2½ million on capital expansion this year, about half of which will be spent for ethane cracking furnaces. Certain surplus furnaces were made available to Polymer from Dow's Freeport, Texas, plant, and erection at Sarnia is already well advanced. Full production is expected by fall. The remainder of Polymer's capital budget will be used to increase styrene output.

* * CI * *

Another route to linear dicarboxylic acids (nylon, polyesters) is indicated by a Canadian patent (456,739) assigned to Du Pont. The patent claims omega-polychloro aliphatic nitriles with a trichloromethyl group at one end, a nitrile group at the other, and four to fifteen methylene groups comprising the intervening chain. Hydrolysis will, of course, yield the corresponding di-acids.

Sulfur dioxide instead of sulfuric acid—eliminating one step—is claimed as a catalyst for the hydration of ethylene to ethanol in a U. S. patent (2,472,618) assigned to A. S. Ramage.

* * CI * *

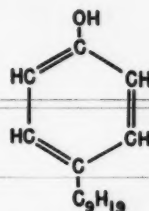
Here and There:

Look for word this fall on a new selective weed-killer of the 2,4-D family that is being developed by Dow. Early unofficial reports are very optimistic. . . . The Vanadium Corp. of America is developing some new processes on chromium and ferroalloys. . . . A new firm, Farm Belt Fertilizer and Chemical Co., is producing mixed fertilizer and super-phosphate in Kansas City. Plant capacity is 30,000 tons a year of the former, 10,000 of the latter; investment is \$300,000. . . . A new wood by-product plant will be built by Portland (Ore.) Shingle Co. to make a wood-derived boiler treatment compound trade-named Borgana. Tested for two years, the product is now being made from cedar waste in a pilot plant at the rate of 50 bbls. a day. . . . A spray-on automobile polish, distributed for professional use only since October, is now being test-marketed for consumer use by its maker, Wingwax Co., Dayton.

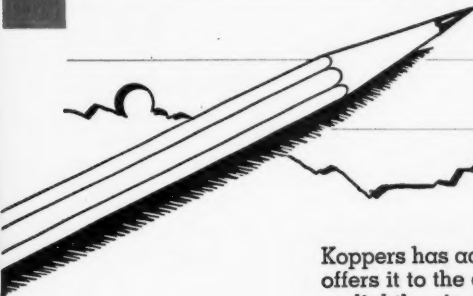
The Editors



● Nonyl Phenol



● *Newest addition
to Koppers series
of Alkylated Phenols*



Koppers has added Nonyl Phenol to its series of alkylated phenols, and now offers it to the chemical industry in commercial quantities. Nonyl Phenol is a slightly viscous, yellow to tan liquid. It is only very slightly soluble in water, but is miscible with common organic solvents.

► REACTIONS

Two of the three normally reactive nuclear positions are unsubstituted in this alkylated phenol, and are subject to reactions such as acylation, sulfonation, nitration, alkylation, and condensation with aldehydes.

The unhindered phenolic hydroxyl group undergoes such reactions as etherification, esterification, vinylation, ethylene oxide condensation, and formation of nonyl phenoxyacetic acid.

► USEFUL APPLICATIONS

The physical properties of Nonyl Phenol indicate that it will be useful for the production of modified phenolic resins, non-ionic surface active-agents, lubricating oil additives, antioxidants, plasticizers and agricultural chemicals.

► PHYSICAL PROPERTIES

Boiling Range	290°—300°C.
Hydroxyl Number (theory 255)	250
Specific Gravity, 30°C.	.940-.944
Refractive Index, 20°C.	1.5118

Research and development chemists may obtain further information and experimental samples of Nonyl Phenol by writing to Koppers Company, Inc., Chemical Division, Dept. CI-7, Pittsburgh 19, Pa.



KOPPERS COMPANY, INC.

Chemical Division • Pittsburgh 19, Pa.



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July,

STAND UP AND TALK

by ROBERT L. TAYLOR, Editor

THOSE MANAGERS WHO REGARD the change from a condition of labor shortage to one of labor surplus as the best thing that could happen to improve employees' respect for the boss and the boss' business had better get their heads up out of the sand.

With industrial production on the down grade, the need for employee-employer cooperation, understanding and mutual respect is greater than at any time since the war, but putting on the economic screws isn't the way to get it. There is an effective way, however, that some chemical companies still have not discovered although it has been around for a couple of years now. It is the right to free speech by employers that is guaranteed by the Taft-Hartley Law.

Many employers still feel they are in the dog house, as though they were still in the New Deal era. They haven't even done a good job of telling employees about Taft-Hartley and what it does and doesn't do. Almost all that employees hear about the law comes from their union bosses, which is but one side of the picture and often a horribly distorted one at that.

Certainly an employer has not only the right but the obligation to talk to his employees. Too often simply because he is an employer he believes that his employees will immediately discount what he says. If this is so, then the position of the employer is hopeless.

The fact of the matter is that employers never have talked. Before the Wagner Act they didn't have to, and during the New Deal era they couldn't.

Most employers are not aware of the national labor law and its effect on their own union relations. They take the attitude, "We get along O.K." Few realize the important point that the Taft-Hartley Law will enable them to do a good labor relations job for their own employees.

There never has been a better time nor a more urgent time to talk with employees with the aim of improving labor relationships. We now have a business situation where employees are anxious to know about the future of their company, for upon this depends their own fu-

ture. The American people do not understand what the issues between labor and management are. Employers must get over their reluctance to talk over these problems.

A Good Investment at Little Cost

A CHEMISTRY PROFESSOR WE MET on a recent visit to one of the up-state New York universities offers a practical suggestion on how industry can lend a hand to education. It is quite simple and obvious, as are most good ideas, but apparently it isn't being practiced very widely.

"Why don't more of the chemical companies," he asked, "give the schools a chance at their discarded equipment before throwing it on the scrap heap or selling it as junk for a few cents on the dollar? I could name a dozen chemistry and chemical engineering departments that would be glad to get their hands on some of the things I've seen rusting in junk piles."

This doesn't mean that the colleges are out begging for trash. But almost all companies occasionally have pieces of plant or laboratory equipment that are still in fair shape and usable but which for one reason or another are being discarded. These are the things that many of the schools would like to have a crack at. Such gifts are of negligible cost to industry, but they can be of immense value to budget-ridden colleges and universities.

Here is a way in which industry can help discharge its obligations to education that is so easy and economical that it is apparently being overlooked. If your company has any discarded, usable pieces of equipment for which it cannot find a taker locally, write CHEMICAL INDUSTRIES and we will be glad to help you locate a school that can make good use of them.

Why We Like the American System

DR. SELMAN A. WAKSMAN of Rutgers University, discoverer and developer of streptomycin, disclosed that the government once judged the research leading to streptomycin as "offering no immediate promise" and passed up the opportunity to subsidize development of the drug.

for dyestuffs

for explosives

for pharmaceuticals

Monomethylamine

for photographic chemicals

for textile specialties

Monomethylamine is now available for prompt shipment. This low-priced primary aliphatic amine is a highly reactive base useful as a raw material for synthesis and as an intermediate in the manufacture of many commercially valuable compounds. Our Technical Service Division is on call to help you in the application of this useful and versatile chemical to your products or processes. Write, wire, or phone today!

properties

Monomethylamine is a flammable gas having a strong ammoniacal odor.

Molecular Weight: 31.06

Boiling Point: -6.0°C. to -5.5°C. at 768 mm. of mercury.

Melting Point: -92.5°C.

Specific Gravity: 0.699 at $-10.8^{\circ}\text{C./15}^{\circ}\text{C.}$

Solubility: Very soluble in water and in alcohol. Also soluble in ether. One volume of water at 25°C. will dissolve 959 volumes of monomethylamine.

Flash Point (30% solution): 0.3°C. (32.5°F.)

Weight per U.S. Gallon (30% solution): approximately 7.7 pounds at 68°F.

specifications

Purity: Not less than 98 mol % of total amines.

Concentration: 30% to 30.5% by weight in water.*

Formaldehyde: Less than 0.3% by weight of the solution.

Ammonia: Less than 0.2% by weight of the solution.

*Available in higher concentrations if desired.



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What's new

ACETYLENE FERMENT

Industrial interest in producing acetylene from natural gas resurges, promises new supply of this versatile raw material.

OVER MANY YEARS the old Union Carbide Co., predecessor of today's giant Union Carbide and Carbon Corporation, poured millions of dollars into research on cracking hydrocarbons to acetylene—and raked in many more millions as profits from by-products of this research.

Now its subsidiary, Carbide & Carbon Chemicals Corp., one by-product of this early research, is preparing to produce acetylene by the thermal cracking of hydrocarbons at Texas City, Texas (*CI*, June 1949, p. 905). Partial combustion of the gases with "tonnage" oxygen reportedly will provide the necessary high temperatures.

Carbide does not say where this acetylene will go, but in producing vinyl chloride at Texas City by thermal cracking of ethylene dichloride, it obtains a pure stream of hydrogen chloride that is just waiting for the arrival of a stream of acetylene to form more vinyl chloride.

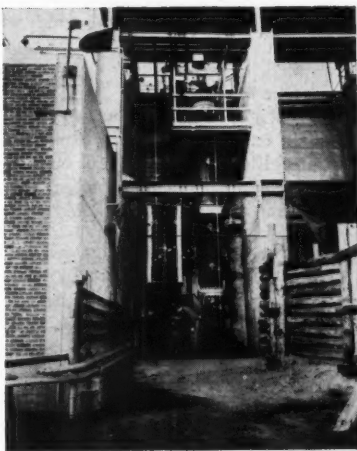
Carbide's plans seem to be farther along than those of other companies immersed in the problems of producing acetylene via hydrocarbon cracking.

Tennessee Eastman Corp. has been dickering for suitable plant sites, but no site purchases have been made (*CI*, Feb. 1949, p. 197). Eastman, it is believed, will use regenerative cracking. General Aniline's interest in low-cost acetylene, in order to bring "Repp-Chemie" to the United States, is well known (*CI*, April 1949, p. 596; May 1949, p. 774). A user and potential producer of acetylene is General Chemical Division of Allied Chemical & Dye Corp., which needs the gas to make Genetrons at Baton Rouge, La.

In fact, there is hardly a major chemical or petroleum company that hasn't harbored ambitions to tap the gold mine that many believe is to be found in producing acetylene by cracking hydrocarbons. And practically all have backed these ambitions with millions of dollars in research and development.

Many Problems

What are the obstacles in the path of



GA's PILOT PLANT: The idea was imported.

these gold-seeking, modern '49ers? To name a few: finding a material of construction capable of handling the extremely high temperatures required to produce acetylene from this source (1200°-1500°C.); purifying the reactor effluent; flash cooling the gases from the reactor to prevent decomposition of acetylene to carbon and hydrogen; removing the extremely small particles of carbon formed during the cracking operation; and coralling sufficient reserves of natural gas at a suitable price.

Finding a suitable material of construction is not a major impediment except in regenerative or recuperative cracking, where the heat required for the endothermic production of acetylene is generated outside of the reactor. But production of the needed energy to achieve the necessary temperature within the reactor, as in arc or oxidative cracking, does not necessitate the operation of any portion of the reactor at these extremely high temperatures.

Oxidative cracking, however, introduces still other problems. If air is used as the oxidizing agent, the acetylene is produced in low concentrations (3-5 percent) in the effluent from the converter. This difficulty can be resolved by using

oxygen instead of air, or an electric arc, but either of these two methods adds expense. Even tonnage oxygen is not cheap, and electricity costs a lot more than fuel.

Concentration

Concentration of the acetylene can be effected by various means. At Huls, where arc cracking was employed, the Germans used water under pressure to solvent-extract the product from the gas mixture. Many other solvents have been suggested, but their high cost has been a bar.

The usual mixture obtained during concentration of cracked high-molecular-weight hydrocarbons is 50:50 acetylene-ethylene, which must be further purified for most uses; but such a mixture is not easily separated. General Aniline, in its vinyl ether production, requires the presence of an inert gas along with the acetylene, and the ethylene in the 50:50 mixture fills the bill. Relatively pure ethylene is the effluent gas from the reactor.

A very high-methane natural gas as the charging stock to an oxidative cracker or an arc cracker obviates the acetylene-ethylene separation problem. Here the C₂ fraction formed is essentially pure acetylene. Such a condition permits the use of Hypersorption (separation by a moving bed of activated carbon) to remove the acetylene (*CI*, June 1949, p. 911). One big advantage: Low-cost production is possible even with a low acetylene concentration in the process gas.

Removing the fine particles of elemental carbon formed by the cracking operation has always been a headache to acetylene producers. How it is done varies from operator to operator, ranging from bag filtration to the use of a Cottrell precipitator. The problem involves proper cooling: Slow cooling permits decomposition of a portion of the acetylene into carbon and hydrogen.

One of the toughest nuts to crack today is location of a sufficiently large reserve of natural gas at a satisfactory price. Moreover, it is desirable that the reserves be close to the final market. Reserves can be found in the more remote areas of the United States, but freight costs on the final products rapidly eat up any savings that might be made by their exploitation.

Also, gas producers are reluctant to sign the long-term contracts that are a "must" for this type of operation; there is always the possibility that the creeping roots of the huge gas pipeline systems now stretching across the country will soon tap their reserves and enable them to get a still higher price for their gas.

What About Calcium Carbide?

In spite of the industry feeling that acetylene by thermal cracking of hydrocarbons is just around the corner, it must be remembered that acetylene from calcium carbide is still a very much alive and potent competitor. And well over half—representing a good 500,000 tons of calcium carbide per year—goes into synthesis of chemicals. Cost of calcium carbide is an elusive item since it is so dependent upon the cost of power. (About 5 KWH are required per pound of acetylene by any electrical process.)

Calcium carbide has been produced in the United States since 1896, four years after its discovery. First producer was the Acetylene, Light, Heat and Power Co., which in 1898 became the Union Carbide Co., now Union Carbide and Carbon Corp.

In 1906 Prest-O-Lite Co., now a part of Union Carbide, began compressing acetylene for shipment by packing the cylinders with a porous material saturated with acetone. This first successful means of shipping the gas provided the real beginning of the huge oxy-acetylene cutting and welding industry.

The second largest calcium carbide producer received its start during World War

I, when National Carbide Co.'s plant at Ivanhoe, Va., began operations. Another producer, the Gas Tank Recharging Co., Keokuk, Iowa, came into the picture at the same time. These two companies became part of the same organization by the early '20s, when they were acquired in the Air Reduction Co. Today the Ivanhoe plant supplies acetylene for Du Pont's acetic anhydride and vinyl acetate production at nearby Waynesboro, Va.

The first chemicals produced from acetylene (in Germany in 1910) were chlorinated acetylene solvents. These were followed shortly by acetaldehyde, made by hydration of acetylene in the presence of a mercuric sulfate catalyst. Acetic acid from acetaldehyde was next on the list, and then acetone, synthesized catalytically from acetic acid.

The acetylene chemical industry first saw light on this continent in 1914 when Canadian Electro Products Co. built its plant at Shawinigan Falls, Quebec. This is now Shawinigan Chemicals, Ltd.

Cracking Tried

Research responsible for the new Texas City unit can be traced back to Union Carbide Co.'s 1914 project at Mellon Institute of Industrial Research. It was not long after the research started that part of the work turned down a road leading to production of chemicals from olefins, also found in offgases from thermal cracking, as well as chemicals from acetylene. Carbide and Carbon Chemicals Corp. and the present day multibillion-pound synthetic aliphatic chemicals industry stem from this fork in the road.

Nineteen hundred and twenty-four saw the establishment, by Carbide and Carbon Chemicals Corp. at Niagara Falls, of the first semi-commercial acetylene plant in the United States. First products included acetaldehyde, acetaldol, paraldehyde, and crotonaldehyde, all of which were used primarily for the production of rubber accelerators and antioxidants. However, Carbide and Carbon's destinies were not slated to be tied to acetylene chemicals again until this year, for in 1925 this plant was expanded into Niacet Chemicals Corp., then owned jointly by Shawinigan, Du Pont and Union Carbide, and now a Union Carbide subsidiary. After a further expansion in 1926, only the appearance of the cellulose acetate industry, with its demand for high-purity acetic acid, saved the venture from collapse. Oxidation of acetaldehyde to acetic acid began in 1928.

Production of trichlorethylene by Roesler and Hasslacher Chemical Co., which later became the Electrochemicals Department of Du Pont, began a short time later at Niagara Falls. This was followed by another plant at Detroit, Mich. Other large-pounding acetylene-derived chemicals, all from carbide, include acetic anhydride via ethylidene diacetate, vinyl chloride and acetate, and neoprene.

Reppe-Chemie

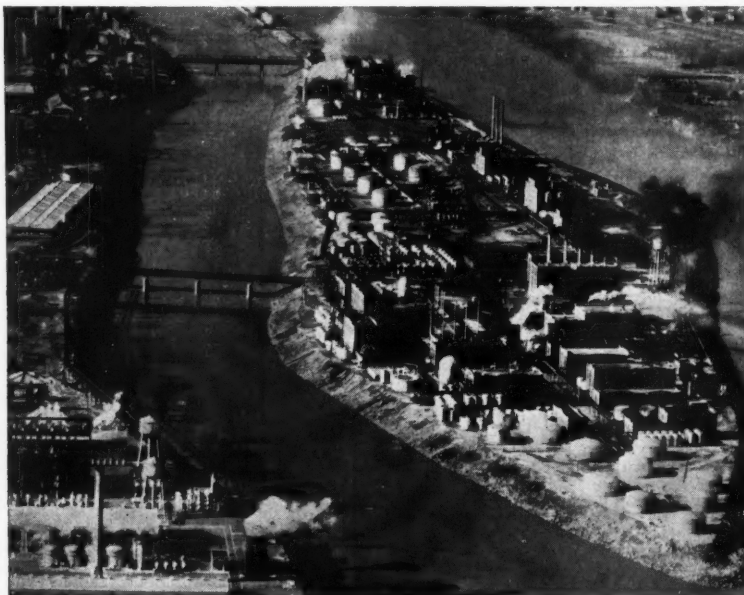
The work of Dr. Julius Walter Reppe on the application of pressure to syntheses from acetylene has received world-wide acclaim. As yet little of this work has been applied in the United States, although the large new pilot plant of General Aniline, most of which is devoted to the investigation of Reppe-inspired techniques, gives promise that phases of this brilliant work will be imported to enrich our economy.

SOME CHANGES MADE

Wax manufacturers find that some carnauba wax is not the old "prewar stuff," requires rigid checking to avoid formulation troubles.

CARNAUBA, long the king of waxes known for its hardness and brilliant gloss, is losing some of its regal qualities. Prior to the war, a shipment from Brazil (where it is obtained from palm leaves) would be accepted with the assurance that it would emulsify properly to make a good polish. Today, manufacturers and importers are going down to the piers and checking each bag before authorizing shipment to their plants and warehouses.

Because carnauba is a natural product the composition of which is not precisely known, it is difficult to say definitely what is the difference between the prewar material and present lots. That there is a



CARBIDE & CARBON AT CHARLESTON: The road was forked.

difference there is no doubt: Whole shipments sometimes won't emulsify in standard formulas; emulsions, which should be grey, are white; the wax requires more alkali for emulsification; apparently good emulsions jell; the wax is stickier; flash points run lower.

Adulteration?

Off batches have been arriving since 1942, and in the last six months or so, they have become so numerous that pier inspection and sampling have become standard. Old wax men, recalling the practically uniform quality they used to receive, are beginning to voice publicly the possibility of adulteration of natural wax.

Adulterated wax was one of the four kinds of carnauba now being offered which A. G. Bowers, chief chemist of the Hunt Manufacturing Co., Cleveland, mentioned before the Wax and Floor Finish Division of the Chemical Specialties Manufacturers Association in Chicago last month. The other types are carnauba similar to the prewar material, carnauba unlike prewar due to differences in picking and gathering, and carnauba whose composition may be altered by refining methods.

The flash point of No. 3 North Country carnauba prior to the war did not run below 585°F., unless obviously adulterated. Since then there has been a gradual lowering, and Bowers reported flash points (Cleveland open cup tester) below 575°F. on 65 lots tested. In many cases, Bowers found that low flash points correlated with tackiness and short shelf life of emulsions, but this depends on the ingredient causing the low flash. Various mixtures of carnauba and less expensive materials such as candelilla, paraffin, oxidized petroleum wax, and some synthetic and natural resins give lower flash points which are easily detected if the addition is amateurish. Some adulterants, particularly oxidized petroleum wax, are less sensitive, but the heavy petroleum odor from the hot material aids detection in this case. Hunt, for one, has ceased purchasing any carnauba that flashes below 572°F.

Changed Technology

Carnauba has been refined by a bleaching clay and filtration process, but this is believed to be giving way to other techniques because of high wax losses. Another possible source of trouble is the more extreme collection methods in which the leaves are beaten and shaken more thoroughly. This may be resulting in more tailings than before. Hot water extraction to remove resins and soap-like ingredients has been reported, and while this may give higher yields, it could result in a lower quality wax.

Specifications

The big difficulty is that there are no close specifications for the different grades of carnauba sold. In the case of melting point, for instance, the range is so great that a batch of pure "prewar carnauba" with a melting point in the higher range could be adulterated with a goodly amount of other ingredients and still melt in the "carnauba range." Bowers, in stating that specifications must be established for flash point, melting point, saponification number, and extraction values with certain selected solvent mixtures, was voicing the opinion of wax men who have had to handle this recently temperamental material.

Until such standards are worked out, however, pier sampling and tests with standard formulations, plus individual specifications such as Hunt's requirement of a flash point over 572°F., will have to do.

ROUGH ON RODENTS

New multiple-dose rodenticide kills unsuspecting rats and mice by internal hemorrhage.

THE STORY of Compound 42, a revolutionary rodenticide developed at the University of Wisconsin, starts fifteen years ago. It was then that Dr. Karl Paul Link and his associates in the Department of Biochemistry at the University of Wisconsin set themselves to the task of discovering why cattle were inexplicably dying in certain areas of the U. S. and Canada.

They found that the deaths, caused by hemorrhage, were due to a toxic principle found in spoiled sweet clover. The toxic compound, isolated, identified and named Dicumarol, is now used clinically as a blood anticoagulant to prevent coronary thrombosis and post-operative blood clots.

Excelsior

Seeking a derivative of Dicumarol which would act faster, Link's group synthesized hundreds of analogs. Compound 42 (the number of the research paper describing it) was first synthesized, as part of that program, in 1942, and its structure was established early the following year as 3-(α -phenyl- β -acetylthyl)-4-hydroxycoumarin. It is obtained by a Michael condensation of 4-hydroxycoumarin with benzaldehyde.

The first tip-off came when the compound was tested on rabbits for anticoagulant activity: Several of them bled to death when blood samples were taken. (Rabbits were ordinarily used for as many as a hundred bioassays over a 3-4 year period.)

Link saw the assay report and noted "Might make a good exterminating agent."

Further work along these lines was interrupted during the war, but in 1947 Lester Scheel and Dorothy Wu, two of Link's students, began to restudy the 4-hydroxycoumarins. This time they assayed the compounds on rats and mice and discovered their superior killing power on these rodents. Compound 42 emerged as the best of the lot.



KARL PAUL LINK: "I am convinced."

It was then discovered that small amounts given over a few days' time were far more potent than a single large dose. It takes 100 mg. per kg. of body weight on a one-shot basis to give a 75 per cent kill; but a total of 7.5 mg./kg. administered over a 5-day period gives 100 per cent kill.

New Technique

By this time the U. S. Department of the Interior's Fish and Wild Life Service was actively interested in the project. Intensive development was undertaken to find out if 42 was a practical rodenticide in spite of the multiple-dosage technique required.

The new technique, it turned out, is no obstacle: The compound is tasteless and odorless and is therefore undetected by the rodents. Neither is there any violent physiological reaction that would warn them against poisoned bait. Also, since rats and mice stick pretty close to home, there's no problem in feeding them poisoned bait several days running. (As a matter of fact, the same technique is used with other rodenticides except that unpoisoned bait is spread around for a few days to "educate" the rats before the poison is incorporated.)

A user not familiar with 42's characteristics would be disappointed by his first 2

or 3 days results. The rats look fine. After that time painless internal hemorrhages develop, the rats become listless, and they finally die from suffocation caused by lung hemorrhage. There is no external bleeding except in case of injury—a fact which will be appreciated by the cleaner-upper.

Many Advantages

The newer rodenticides such as ANTU and 1080 are potent "anti-personnel" weapons in the war against rats, but Link believes that Compound 42 has some distinctively superior lethal abilities not shared *in toto* with any other rodenticide. First, very small quantities will do the job. A fortieth of a milligram kills the laboratory albino rat; and a tenth of a milligram—the exact amount is still to be determined—is probably enough to kill a wild rat.

Second, because the compound is palatable and because the rat doesn't know what hit him until several days later, the animal doesn't become bait-shy.

Third, the rodent doesn't develop a tolerance for the poison.

Relatively Safe

Finally, the chemical is relatively safe to larger animals and people. The lethal dose, as expressed in mg. per kg. of body weight, goes up as the animal's weight increases. Incorporated in solid or liquid bait at low concentration (1:10,000), a cat or dog or curious child would have to consume an awful lot of bait before injury would result. Besides, unlike many other rat poisons, an effective antidote exists in massive doses of vitamin K.

Link, curious about 42's effect on chickens, fed some, in growing mash containing about 0.0025 per cent of the compound on a dry solids basis, to five cockerels at his country home. The cockerels grew normally and were eaten after nine weeks by the Link family. At the same dosage level, rats die in ten to fourteen days.

Will be Commercialized

The compound is covered by U. S. patents (Nos. 2,427,578-9) assigned to the Wisconsin Alumni Research Foundation. Manufacturing plans are being formulated (*CI Newsletter*, June 1949) and several Government agencies, including the Department of Agriculture and the Public Health Service, are following the development closely.

"While 42 might not be the last word in man's battle against rodents," says Link, "I am convinced that through it the extermination of rats and mice and possibly other rodents will be put on a sound scientific basis. I regard its discovery of greater significance than the discovery of Dicumarol."



PURE GAMMA BHC: The smell is gone.

666 IS 99.8

Most insecticidal of benzene hexachloride isomers, gamma has practically no odor, doesn't build up residues.

IF YOU ADD chlorine to benzene, you get a pretty good insecticide variously called benzene hexachloride, hexachlorocyclohexane, Gammexane, 666, BHC or just plain benzene hex. You also get a lasting stink.

Five isomers have been identified in the chlorination product, and the one of greatest insecticidal value, gamma, is present in about 12 per cent concentration. Isolate this and you have a practically pure chemical (99.5-99.8% gamma BHC) which has virtually none of the obnoxious odor of the technical mixture of isomers, and a lessened tendency to impart off-flavors when used to treat crops.

Big Push

Hooker Electrochemical Co. and the Pennsylvania Salt Manufacturing Co. are both manufacturing this pure isomer. The Dow Chemical Co. also makes a small quantity, but buys most of its requirements for formulating. Manufacturing costs are high, and in some cases finished product costs exceed those of other insecticides that may be used. Formulations have been available for several seasons, but this year their extreme toxicity to many insects and ease of use are being brought more forcibly to the attention of the insecticide industry, and a bright future seems assured. Other makers of the technical grade material (12-14% gamma as a mixture of isomers) are experimenting with pure gamma BHC, and may add it to their line next season.

Niagara Chemical Division of Food Machinery and Chemical Corp. manufactures a series of pure gamma formulations trade-named GamKil (1%, 12%,

24% sprays; a 25% by weight emulsion) and its Farm and Garden brand 1.2% dust or spray. California Spray-Chemical Corp. has a 25% wettable powder, 20% liquid emulsifiable concentrate, 25% powder for dusts, and a finished dust of 1-3% gamma. Pennsalt markets a 25% wettable powder (Penco Hi-Gam W-25) suitable for suspension sprays as well as for compounding into less concentrated dusts. (Pennsalt also has a technical BHC with 36% gamma and 64% other isomers.) The Dow Chemical Co.'s Hexadon wettable high gamma type is a 25% wettable powder made from the pure gamma.

That's Not All

While the absence of the persistent musty odor characteristic of ordinary BHC widens pure gamma BHC's scope, there are other advantages to its use. Because it is volatile, it does not accumulate with repeated treatments as do the other isomers. This reduces the chance of imparting off-flavors to crops and leaving residues toxic to higher animals. Moreover, since the pure gamma formulations allow crop dosages to be reduced ten-fold, these possibilities are further lessened.

Chronic toxicity is not a problem (Pure Food and Drug Administration reported that the beta isomer is the one that accumulates in the body); ditto skin and membrane irritation (the delta isomer is the guilty one here). Pure gamma's acute toxicity to higher animals is only about twice DDT's, but since the average dose is $\frac{1}{40}$ to $\frac{1}{100}$ that of DDT, the amount present in any application is actually less hazardous. An additional advantage lies in lower freight rates, since the rate per unit of insecticidal power is proportionately lower for high concentrations of pure gamma.

Fly Control Too?

Insecticidal activity of pure gamma BHC is three-fold: it works as a contact

poison, stomach poison, and fumigant. About half of current production is being used to treat field crops and fruit trees since it is very effective against such insects as aphids and leaf miners on spinach, thrips and aphids on a variety of vegetables and nursery and ornamental plants, and many fruit tree insects. It is also used against certain shade and forest tree insects, and to treat bean and corn seed.

In addition to crop applications, pure gamma is used for roaches; human lice; termites; chiggers, ticks, scabies, and lice on cattle, hogs, sheep and goats; and mange control on cattle and hogs. Much interest has been aroused in the latter uses, for the material has recently been recommended for mange control on dairy cattle. Excellent experimental results have been obtained with it for fly control, and U.S.D.A. recommendation for such applications even around dairy barns is anticipated.

EMPHASIS ON FACTS

Plastics industry fights for wider consumer acceptance with informative labeling program.

PLASTICS admittedly have advantages to offer for many applications—if they are used properly. But that's a big "if," and the plastics industry is just as painfully aware as its customers that poor formulations, improper use, and exaggerated claims on the part of some manufacturers can tear down in a day the markets for its products.

The Society of the Plastics Industry started looking into the problem a couple of years ago. Committees were appointed, much solid groundwork was laid, and just a few weeks ago—at the Society's annual

business meeting—an informative labeling program was unwrapped.

Facts, Facts, Facts

Repeatedly emphasized in the presentation of the program was the need to substitute facts for claims and vague generalities. These facts, hopes the Society, will appear on labels, display cards, in instruction booklets, and anywhere else they are likely to be read.

In order that the labels will be consistent and uniform, the committee—which was headed up by Elmer French, Firestone Plastics Co.—suggested an outline:

1. What it is (uses)
2. What it will do (performance)
3. What it is made of (composition)
4. How it is made (construction)
5. How to take care of it (limitations)
6. Guarantee (optional)

Enlightenment and Sales

The labels themselves are only one facet of the program. Just as important is a thorough promotion plan, already in the works, designed to acquaint not only the consumer but also plastics manufacturers, fabricators, jobbers and retailers themselves with the advantages of factually presented products.

Underlying the whole program is the theory that an enlightened consumer is a receptive and confident consumer. And the consumers' market—which has hit plastics, too—makes plastics men more eager than ever to prove the truth of that theory.

POULTRY SAVERS

Two new organic compounds will fight \$10 million poultry loss from coccidiosis.

DESPITE attempts at control through sanitation, suppression, and treatment with various drugs, the parasitic disease, cecal coccidiosis, is estimated to cause losses to poultry raisers of as much as \$10 million annually. Now two new chemicals, one a sulfa drug and the other a member of the class of compounds known as bisphenols, appear to offer low-cost immunity from the disease when incorporated in small amounts in poultry feeds.

Two Cents Per Bird

The sulfa compound, sulfaquinoxaline, was developed by Merck & Co. chemists seven years ago in their search for new antimalarials. The drug proved too toxic for human consumption, but subsequent work by the Merck Institute showed it to be highly active against bird malaria. This led to the coccidiosis experiments, which proved the compound to be very effective against poultry diseases such as

acute fowl cholera and intestinal as well as cecal coccidiosis.

Commercial production of sulfaquinoxaline was started last year and it is expected that the product will make a sizable contribution to Merck's sales of sulfa drugs in 1949. The company claims that poultry raisers can use sulfaquinoxaline in their feeds for as little as two cents per bird.

0.2% in the Feed

The bisphenols, made by The Dow Chemical Co., are still in the developmental stage for this use. However, a Dow representative claims that if continued tests and field trials support the



J. E. JOHNSON: Aid for sick chicks.

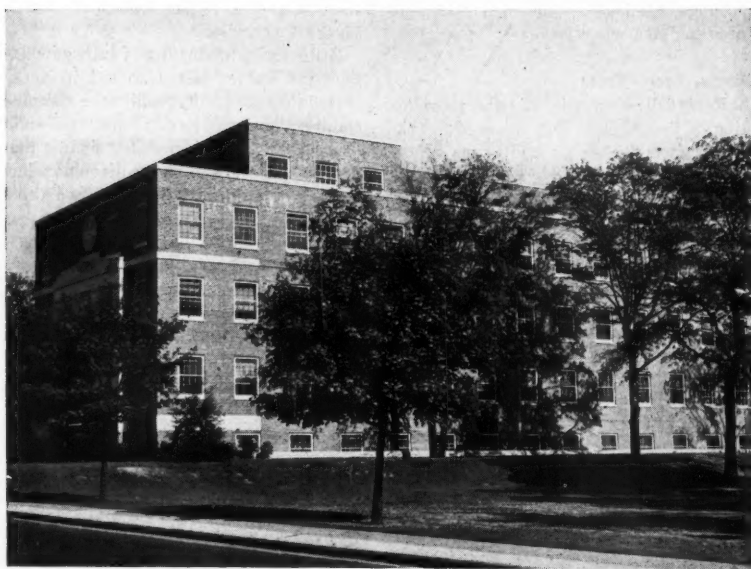
encouraging results of laboratory experiments, certain bisphenols should assume major importance in the control of coccidiosis and other livestock diseases. The company believes that low cost is going to be one of the bisphenols' principal advantages, making it economically attractive for use in standard feeds. Protection is provided by concentrations of 0.2 to 0.3% in the feed of young chicks.

The bisphenols chemically are compounds of the dihydroxy diphenyl methane type. Dow researchers, headed by biochemist J. E. Johnson, have investigated more than 130 variations of two classes of these compounds: the 2,2'-methylenebisphenols and the 4,4'-alkylidenebisphenols. Among the effective members selected for more intensive investigation were 4,4'-isopropylidenebis(2-isopropylphenol) and *p,p'*-isopropylidenedi-*o*-cresol.

Dr. Johnson and his co-workers have now narrowed the field down to four most promising compounds. By fall they hope to be able to announce one of these as best.



ELMER FRENCH: Out with generalities.



NEW RESEARCH FACILITIES: Three baskets.

MERCK'S CALCULATED RISKS PAY OFF

Antibiotics, sulfonamides and vitamins comprised 63 per cent of Merck's record sales in 1948.

THE OLD TRUISM that you have to run at top speed to stay in the same place applies with special vehemence to the pharmaceutical industry. But Merck & Co., Inc., has been running even faster; for its 1948 sales and profits were $2\frac{1}{2}$ times as large as in 1939. In both years the percentage of net income on sales was 11.7.

In no intervening year was the profit margin after taxes quite so great. High wartime income taxes are a partial explanation of the lower profit margins, but another—perhaps an even more salient one—is the quiet revolution that Merck has been undergoing in the past decade.

Three Baskets

In 1948, three product groups—antibiotics, sulfonamides and vitamins—accounted for 63 per cent of the company's net sales; those same groups, on the other hand, contributed only 17.5 per cent of 1939 sales. Moreover, the profit margin realized on the same three groups is higher than on the company's older products.

Merck's entry into each of these three fields was a calculated gamble. During the late '30s Merck pioneered the synthesis of vitamins B₁ and B₂ and became the first American licensee to produce sulfa pyridine.

The firm's success with vitamin synthesis was largely responsible for its

losing gamble with penicillin (*CI*, July 1948, p. 25). Expecting its chemists to develop a penicillin synthesis, the company hesitated to sink capital in fermentation equipment. A practical synthesis failed to materialize, and Merck's competitors preempted the lion's share of the market before the erection of Merck's fermentation unit.

In the case of streptomycin, faith in ultimate synthesis didn't lead Merck astray for a second time. The company jumped in with both feet, was the first to rush completion of a full-scale plant. Late last year it also started to make dihydrostreptomycin, a derivative that is better tolerated by the human system.

Actually, antibiotics is the most important of the three baskets holding two-thirds of Merck's eggs. Dollar sales (as opposed to unit sales) of vitamins—which include B₆, C, E, K, niacin and calcium pantothenate in addition to the original B₁ and B₂—have declined since 1943, and are surpassed by antibiotics. The sulfonamides also reached their peak in 1943, for about that time the antibiotics started to replace them in clinical use.

It now appears that over-all industry production of antibiotics exceeds demand, and prices are therefore unsettled. This has been true of penicillin for some time, and now it has begun to effect streptomycin and the dihydro derivative. The price to wholesalers of streptomycin has

fallen from \$15 per gram (1945) to 64c (March 23, 1949).

One Jump Ahead

It is obvious that the relatively short pay-out life of this type of product makes a high profit margin necessary. It is equally true that profits on a particular product are greatest during the period of rapid volume expansion, less in the introductory period and also after volume production has been established and the price begins to decline.

New products, then, are vitally necessary to continued growth; and Merck spends about 6 per cent of its net sales—well above the chemical industry average—for research and development.

New products, consequently, are consistently coming off the research assembly line, and high capital expenditures are commonly necessary to turn research results into sales profits. To raise the necessary capital, the company realized \$5.6 million from a stock sale in 1946 and borrowed \$5 million in 1947 and 1948 from banks.

This April a preferred stock issue netted the company an additional \$7 million. (Another \$3 million's worth has been authorized but not issued.) At the same time the common stock was split 2-for-1.

In the meantime, Merck's plants and equipment grew in value from less than \$4 million in 1939 to \$27 million at the end of 1948. Over \$9 million was spent on new construction during 1948, and at the end of the year an additional \$8 million remained to be spent on previously authorized projects. The large expansion program could not have been effected, obviously, without the retention of a considerable proportion of earnings.

Research, New Products

The major portion of the money spent or authorized was earmarked for expansion of production—especially of antibiotics and vitamins. But a large share is being spent for new research laboratories and plants to produce new products.

Two products first introduced during 1948 are expected to contribute handsomely to 1949 and subsequent profits. One is vitamin B₁₂, an anti-anemia factor which can be made by fermentation. It was first isolated by a team of Merck researchers in April of last year, production by fermentation with a strain of *Streptomyces griseus* was discovered in November, and the compound was placed on the market last February. Such speed—ten months from isolation to commercialization—is telling evidence of a smoothly functioning organization.

The other product is sulfaquinoxaline, a sulfa drug that turned out to be too

toxic for human use but which is very effective against fowl cholera and coccidiosis. Commercial production was begun last year (see p. 33).

Another new product, the commercial potentialities of which are still only a speck on the distant horizon, is Compound E (also known as cortisone), which has given dramatic relief to arthritis sufferers. Discovered by Dr. E. C. Kendall, of Mayo Clinic, it was finally synthesized by Merck's Dr. L. H. Sarrett. None is presently available, but Merck hopes to simplify the synthesis, make some—but not enough to meet demands—available next year.

Three Patterns

While revolutionary changes have been taking place in the production pattern, shifts of far-reaching significance have also taken place in the administrative and sales patterns.

A large proportion of the stock has always been held by the Merck and Rosengarten (through merger in 1927 with the Powers-Weightman-Rosengarten Co.) families; but the necessity of outside financing has reduced their combined holdings to 33.3 per cent of the voting stock.



GEORGE W. MERCK: Three patterns.

The administration is on a broader base; and indicative of that trend was the elevation last year of five members of the executive staff to vice-presidencies and the addition of Dr. Alfred N. Richards, president of the National Academy of Sciences, to the board of directors. George W. Merck this year became chairman of the board as well as president.

Out of the sales figures of the past ten years is emerging the apparent pattern of an increased dependence on exports. They accounted for 2½ per cent of sales in 1939, about 20 per cent last year.

Exports are currently taking up the slack caused by a shift in the domestic

pharmaceuticals field. Merck's best customers, the pharmaceutical houses, used to buy Merck's and other manufacturers' products for packaging and resale. Now they have their own research laboratories and their own new products, compete more and more with their suppliers.

In the face of all these pressures, the only direction to go is up—and that's where Merck obviously has been going. First-quarter profits this year were down from last year, mainly because of lower streptomycin prices, but profits from new capital facilities are expected to recoup the difference. Then the cycle can start again.

FLUOROLUBRICANTS

Lower fluorocarbon polymers being offered as special high stability oils and greases.

LAST year commercial availability of a new fluoroplastic, Kel-F, that resists attack by the strongest acids and alkalis was announced by the M. W. Kellogg Co. (*CI, October, 1948, p. 586*). Kel-F was described as a moldable polymer of trifluorochloroethylene (fluoroethene, for short), a highly inert fluorine compound developed during the war by Prof. W. T. Miller, of Cornell University, in connection with the Manhattan Project.

Now lower polymers of the same compound are bringing to industry similar unique properties in the form of oil- and grease-like materials. These fluorolubricants, as they are called, range from water-white mobile liquids to tough wax-like materials at room temperature. They are extremely inert both chemically and thermally.

Most of their uses are still in the experimental stage, but companies who are working on them say they look good for such things as lubricants and sealants on equipment handling liquid oxygen, concentrated hydrogen peroxide, and other highly reactive materials; ingredients of pressure transmission, power transmission, and damping oils; lubricants and pore-sealing agents for fluorine-containing plastics. Like the fluoroplastics, however, they are dogged by high price—currently \$25 a lb., although one manufacturer says this could come down to \$15 with an increase in output.

Two companies—M. W. Kellogg and the Hooker Electrochemical Co.—are now making fluorothene lubricants, both on a limited scale.

Hooker Increases Yield

Hooker entered the field as a result of its work in fluorine chemistry for the Manhattan Project during the war. A couple of years ago it purchased the Government plant at Niagara Falls in

which the first fluorolubricants were produced. They had been developed by a research team headed by Professor Miller in response to an urgent demand for an inert lubricant that would stand up in the pumps at Oak Ridge handling uranium hexafluoride. Hooker's present Fluorolube "S," in fact, is the same material as was used for this purpose.

When Hooker acquired the Government plant it turned its own research staff loose on the fluorothene polymerization process. Through the use of a different solvent and catalyst it has succeeded in substantially improving the original yields.

The fluorothene polymer is made up of a linear chain of $-\text{CF}_2-\text{CFCl}-$ units. Terminal groups on each end of the chain are probably derived from the catalyst used, but their structure is uncertain. The polymers are stabilized by subjection to rigorous fluorination conditions. This fluorinates the terminal groups, replaces with fluorine any loosely held chlorine in the chain, and removes all traces of hydrogen.

Vacuum distillation is used by Hooker to separate its stabilized Fluorolube into three fractions:

Fluorolube "FS"—an odorless mobile liquid with a viscosity ranging from about 7 centipoises at 100° F. to about 2 at 210° F.

Fluorolube "S"—a clear, oily liquid with viscosity ranging from about 70 to 8 at 100 and 210° F. respectively.

Fluorolube "HG"—an opaque, white wax-like material with a melting point of 68° C.

Densities at 100° F. of the first two are 1.86 and 1.92, respectively; of the latter, at 160° F., 2.00.

By varying and combining these three fractions a wide variety of special compounds can be made.

Hooker is currently producing the Fluorolubes on a large scale experimental basis and has much of the equipment available for larger-scale production.

Kellogg to Semi-Works

As would be expected, M. W. Kellogg Co.'s work on fluorothene lubricants has gone hand in hand with its development of the higher-polymer Kel-F plastics. It hasn't definitely decided yet, but believes it will use the Kel-F name for the lubricants as well as the plastics, since the two are so similar chemically.

Kellogg makes its own monomer and claims to have a polymerization process that differs from both the original and that used by Hooker. Its production is still on a laboratory scale, but it expects to move into semi-works by early Fall. It has not yet settled on what fractions it will produce. It is currently using one of the materials as a plasticizer for Kel-F plastics.

Outlook

Fluorothene lubricants will probably be a very specialized and custom business for some time. The materials possess some unique properties that are unmatched elsewhere. Their heat stability, for example, is higher than that of any other liquid lubricant, including the silicones. And when they do reach their decomposition temperature (325-350° C.) they vaporize completely, leaving no residue. They are also extremely stable in the presence of hydrogen peroxide.

Some Drawbacks

On the other side of the ledger, in addition to price, is the fact that the materials have a poor viscosity index compared with the silicones and ordinary lube oils. They are not compatible with petroleum lubricating oils and so are not suitable as oil additives.

The entire field of fluorine chemistry is still in its highly speculative infancy. At the moment the fluorolubricants look as promising, from a commercial standpoint, as any of the materials in the fluorine starting line-up.

NAME TO FIT

NAIDM changes name to Chemical Specialties Manufacturers Association, recognizes expanding interests of members.

SEVEN MEN met in New York City in 1914 and, out of a common interest in manufacture of articles described in the Federal Insecticide Act of 1910, founded the Insecticide Manufacturers Association, Inc. Last month at the Drake Hotel in Chicago, some 400 individuals representing about 200 firms, government agencies, and scientific institutions took time out from their sweltering sessions on technical and marketing problems to change the name of this organization—renamed twice since its founding—to Chemical Specialties Manufacturers Association, Inc.

Expanding Horizon

Once before a name change—to Insecticide and Disinfectant Manufacturers Association, Inc., in 1931—had recognized the expanded activities of members, Gordon M. Baird, present president of the association, recalled in addressing the group prior to its unanimous vote for the new designation. (This was changed the following year to the National Association of Insecticide and Disinfectant Manufacturers, Inc., the familiar NAIDM.) The current rechristening, however, is far more important, for it embodies a reorganization that establishes five di-



BAIRD AND HAMILTON: Reversing a trend.

visions within the association, and leaves the way open for additional groups as a particular line of manufacture becomes increasingly important. The newly organized sections are: insecticides; disinfectants and sanitizers; wax and floor finishes; soaps, detergents, deodorants, and sanitary chemical products; and aerosols.

Cinderella Business

At first glance it may seem superfluous to have a special aerosol section since aerosols are really gadgets for dispensing a variety of products, most of which are included in the association's four other groups. However, their tremendous growth since their adaptation from the G. I. bug bomb to household, garden and industrial insecticides, deodorants, paint and lacquer, fire extinguisher fluids, disinfectants, wax and pharmaceutical and cosmetic materials has given rise to a new figure in the specialties business—the custom canner (*CI, April 1949, p. 562*). Although he probably puts out his own aerosol line, much of his business is “canning” the products of other manufacturers. Thus, the association has recognized the *status quo* in setting up a separate division where the special technical problems affecting aerosol developments can be considered by these canners, container and propellant suppliers, and the many companies in the association who use this service.

This rise of aerosols from an unknown type of product to a leading specialty that is a tonnage consumer of chemical raw materials illustrates the Cinderella character of the specialties business, and its place in the over-all chemical industry. A roll call of companies at the Chicago meeting of the newly named specialties association would have shown that the large chemical suppliers are well aware of the relatively small specialty manufac-

turers' importance in moving their chemicals. The “Who's Who” of the chemical industry is included in the association, and these company representatives take a leading part in solving the technical and business problems that cause the little fellow (and big fellow) trouble. This results in better specialties products, and a broader market for the basic chemicals used in their formulation.

Many Problems

Many other types of products have experienced changes no less dramatic than the rise of aerosols, and these too have brought their special problems. Most of the insecticide products use synthetic chemicals that have become commercial materials only within the last five years. Synthetic detergents too have really come into their own since the war, and new types are being added continually. Quaternary ammonium compounds have won a larger place in the sanitizing field. The new divisional organization is expected to make it easier to bring to light problems arising out of this growth, and to offer solutions behind which the association can put its entire weight.

Illustrative of the type of group action that must be taken is the resistance to state legislation for the control of insecticides that does not incorporate provisions of the Federal registration and labeling requirements. H. W. Hamilton, secretary of the association, in recommending such a policy, pointed out that public protection can best be obtained by proper enforcement of existing regulations instead of further registration. He also urged the industry to promote use of the term “pesticides” instead of “economic poisons” to describe such products, and suggested action to have the U. S. Department of Agriculture hold jurisdiction over legislation, investigations or control of insecticides.

Unfavorable publicity about DDT and other synthetic insecticides is another problem immediately affecting the insecticide division, but which could cause any manufacturer trouble. Hamilton called for members to avoid panicky statements and to strive to prevent unqualified persons from passing on the use and hazards of such products.

Trend Bucking

In launching a reorganization plan that will probably attract more members, the Chemical Specialties Manufacturers Association is reversing a trend evident in trade associations in times of contraction. There is room for expansion since the sales potential of the products its members make has not been realized completely, and new types are always being introduced. With a greater opportunity for all facets of the specialties field to improve and promote their products, the association is bound to grow further and make the chemical industry more specialties conscious.

SOLID GAS

Low-temperature adsorption of natural gas on fuller's earth proposed as solution to high offpeak loads.

BY "STORAGE" of natural gas on fuller's earth, J. F. Pritchard and Co. and Floridin Co. propose to solve two of the natural gas industry's major problems: supplying sufficient gas to meet peak loads during winter cold spells, and, for long-distance pipeline deliveries, providing gas during those rare periods of interruption of pipeline service.

Two Hundred Volumes

One volume of fuller's earth will adsorb 200 volumes of methane at about -250°F . Also, according to C. A. Spangler, of Pritchard, in the *Oil and Gas Journal*, it is safer than other known methods of storage. For all practical purposes, the gas is stored as a volatile solid. Thus in case of a break in the storage vessel, the solid would spill out and ice would begin to form immediately on the surface of the particles. This solid coating, provided by the air, would serve two purposes: insulating the particle from the heat necessary to volatilize the adsorbed methane, and serving as a tight film through which the methane would have difficulty in passing. Firemen will appreciate the extra time that this will provide.

Operation

In operation, the gas to be stored is first passed through refrigeration equipment and then into an inlet header with

many small openings. This header is on the bottom of the storage vessel and the gas is adsorbed as it passes upward through the bed of adsorbent. Only a portion of the gas entering the storage chamber is adsorbed; for the heat of adsorption of methane on fuller's earth is approximately 2000 calories per mol. The excess gas, which has taken up this heat, is returned to the refrigeration system for further cooling. After the optimum storage temperature has been reached the refrigeration system is continually applied to the system to extract the heat which leaks in.

Desorption is accomplished by the reverse of the above adsorption cycle. A rise of 15°F . from the optimum storage temperature almost completely desorbs the methane.

Cost

According to Spangler, 50 million standard cubic feet of gas would require 4,375 tons of adsorbent occupying 250,000 cubic feet of space. Present quotations on fuller's earth are \$50 per ton, making the investment in adsorbent material nearly \$250,000. In spite of this, Spangler states that the investment cost will compare quite favorably with the investment in a liquid storage system.

Refrigeration requirements for the two methods are about the same, for methane's heat of adsorption is nearly equal to its latent heat of condensation.

VANISHING FABRIC

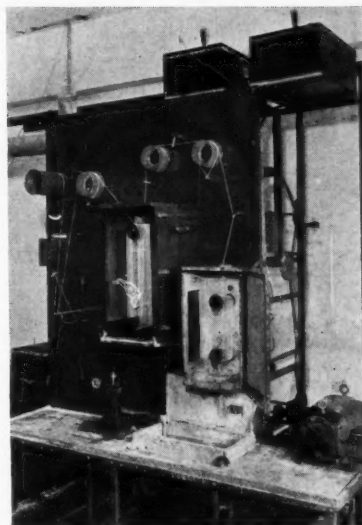
Specialty textile products are produced from alkali-soluble alginate or carboxymethylcellulose fibers.

"NOW YOU see 'em, now you don't" is a magician's cliché that could well be applied to a new kind of spun fiber that dissolves in dilute alkali. Fibers of this nature are made in Great Britain from salts of alginic acid (obtained by processing seaweeds) and in this country from heavy metal salts of carboxymethylcellulose.

Here experimental work has been carried out by the U. S. Department of Agriculture's Southern Regional Research Laboratory at New Orleans, La. Fibers are spun from sodium carboxymethylcellulose (CMC) and salts of such metals as lead, copper, and aluminum. The CMC solution is extruded through a spinnerette, much as in rayon manufacture, into a bath containing metal salts. The fibers are colorless or lightly tinted, depending on the metal employed. The possibility of spinning useful fibers in this way was brought to light during studies of partial carboxymethylation of cotton to increase its absorbency.

Planned Scarcity

At first thought, a fiber that dissolves in soapy water or other dilute alkali doesn't seem very practical. It is just this property, however, that makes it useful as a "scaffolding" fiber in the weaving of novel fabrics from various textiles. Its dry strength (about equal to that of wool, less than half that of cotton) is adequate for this purpose. It is suitable for use as a spacing agent to supply the so-called "missing threads" in specially woven fabrics such as filter cloths, surgical dressings and decorative open-work cloths, where dissolution of the fiber leaves a planned scarcity of threads. It can also



USDA's TEST SET-UP: Soluble scaffold.

be used as supporting threads for fine worsted yarns, mohair, and various sheer fabrics which could otherwise not be woven. An English woolen fabric, the lightest ever made, weighing only $1\frac{1}{2}$ oz. per sq. yard, was made in this way using alginate fibers. It was displayed just recently at a Glasgow exhibition of textile materials.

Alginates Expanding

Alginates, like carboxymethylcellulose, are known primarily as protective colloids in foods, cosmetics, water treatment, etc. The Scottish Seaweed Research Association, formed in 1944, thinks that they could become a \$50 million-per-year industry. Accordingly, the Association has developed an aerial survey system for finding, and a mechanical grapnel device for harvesting, seaweed.

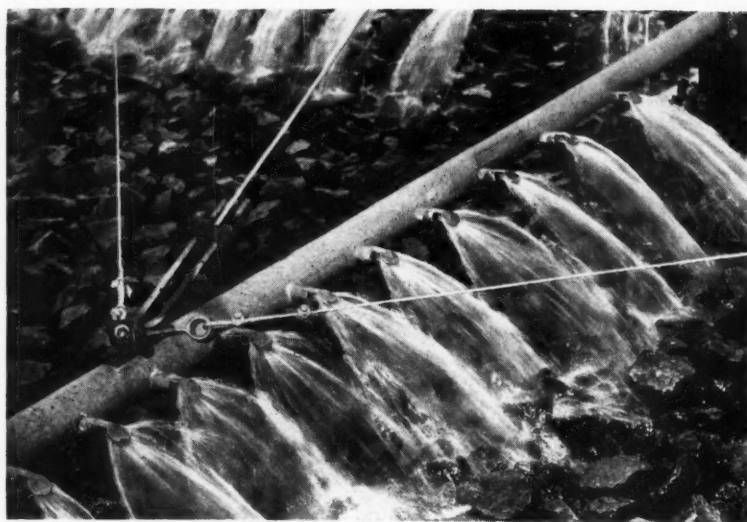
Practical results are at least two years off, but a happy ending to the Association's researches will make seaweed harvesting a stable business rather than a beachcomber's part-time job.

HOW WASTES ARE DISPOSED OF

At a Synthetic Resin Plant

by BRUCE W. DICKERSON, Engineering Department
Hercules Powder Co., Wilmington, Del.

BIOLOGICAL OXIDATION IS THE ONLY MEANS of producing a satisfactory effluent from the process wastes of the Burlington plant of Hercules Powder Co. Contaminants include such organic substances as rosin acids and oils, phenolic materials, and formaldehyde.



Trickling filters organic materials from the effluent water by biological oxidation.

WASTE disposal and plant operation are no longer two separate problems; the former is part of the latter. With Federal and local authorities putting teeth into industrial waste disposal regulations, knowing how various types of plants have solved their disposal problems can help chemical manufacturers. An examination of the system installed at Hercules Powder Co.'s Burlington Works not only will show how a synthetic resin plant handles its waste; it will reveal principles that will find broad application.

The plant is located on the Delaware River, north of Burlington, N. J., and directly across the river from Bristol, Pa. Here various types of synthetic resins, including some of the high molecular weight alcohols, are manufactured. Process wastes contain varying amounts of rosin acids and oils, phenols, cresols, formaldehyde, and other organics. All of these are in solution except the oils, which are partly in suspension and partly in

emulsion. Sanitary sewage disposal is also part of the overall picture.

The Delaware River lying adjacent to the plant would seem an easy and effective answer to the waste disposal problem. However, stream pollution standards established by the Interstate Commission of the Delaware River Basin (hereafter referred to as Incodel) govern the quality of waste waters emptied into the river. Furthermore, the cities of Burlington and Bristol use the river for their city water supply. Adequate treatment of plant waste is therefore necessary so that it won't affect the taste and odor of the water. Stream standards set by Incodel include a reduction in B.O.D.* of 85% with a maximum of 100 ppm. elimination of offensive taste- and odor-producing substances.

* B.O.D., the biochemical oxygen demand of sewage, sewage effluents, polluted waters or industrial wastes, is the oxygen (in parts per million) required during stabilization of the decomposable organic matter by aerobic bacterial action.

BIOLOGICAL OXIDATION REQUIRED

The plant wastes are organic in nature and have a high B.O.D. They are taste producers and oily in composition. Biological oxidation is the only purification process which will produce a satisfactory effluent. Such treatment can be accomplished by the activated sludge process or by the use of trickling filters. The latter method was selected because of its (1) high resistance to shock (intermittent overloads), (2) simplicity of operation and control, (3) wide flexibility in two-stage operation.

This resin plant incorporates processes in operation at several locations but never before combined in one area. Although wastes from each can be adequately studied, the effect of their mixture must be known, and this was determined by laboratory experiments. B.O.D. values of individual wastes are as high as 10,000 ppm; the composite to be treated averages about 500 ppm B.O.D.

Due to the high ground water table in the area, which is greatly affected by the tidal condition of the river, deep sewer lines were undesirable. To eliminate these, a sewage lift station was constructed near the middle of the process area and a 6" force main installed to carry the effluent to the waste treatment plant, near the river several hundred feet from the plant.

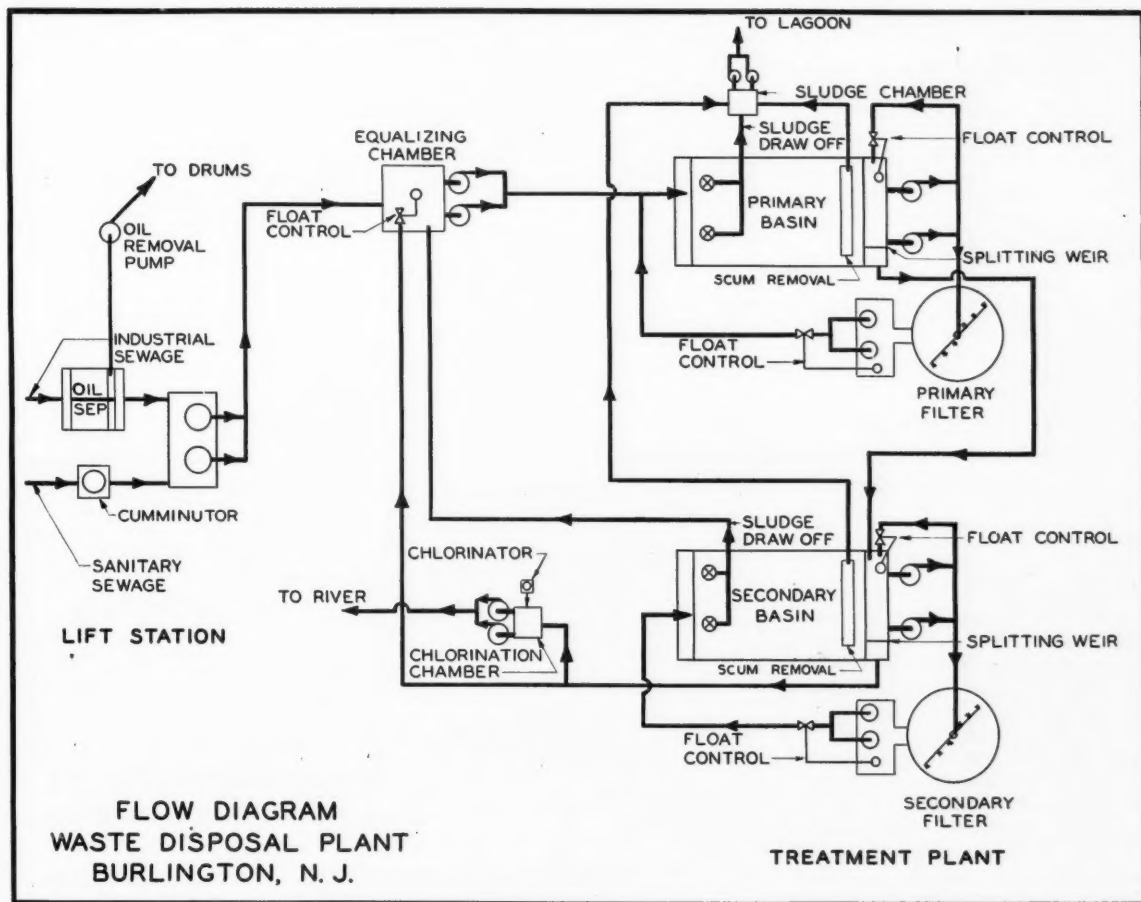
Separate sewers were installed for the contaminated process waste waters and sanitary sewage.

It was felt that there might be accidental spills in process operations which if allowed to pass through the system would completely upset waste plant operation. To prevent this, the lift station has two receiving chambers of ample size to take a spill plus normal waste water. Incoming waste water is discharged into them during the emergency through automatic bypass valves controlled electrically from stations in the process buildings.

The two chambers have motor driven agitators to allow batch treatment of the collected waste before redischARGE into the system.

The sanitary sewage is passed through a comminutor before discharge into the station wet well.

The lift station is provided with two sump-type sewage pumps: one for normal operation and one a spare. Their capac-



ity varies with the level in the wet well, reaching 100 gpm at maximum level and dropping to 50 gpm at minimum. This allows a wide range in capacity without a costly variable speed motor control.

The waste treatment plant is designed for an average flow of 45 gpm and a total B.O.D. loading of 300 pounds per 24 hours. The plant comprises an influent receiving well, primary basin and trickling filter, secondary basin and trickling filter, chlorination chamber, and sludge receiving well. Filter effluents are recycled with ratios running up to 8:1.

Figure 1 is a flow diagram of the waste treatment plant.

Process plant operations result in a wide variation in volume of waste water discharged. The disposal plant, however, must always have a flow through it so that the filters won't run dry. To guard against this possibility, there is an influent receiving well at the treatment plant to which the final effluent, prior to chlorination, can be returned and mixed with the incoming waste. The amount returned is controlled by a butterfly valve actuated by the level in the well. The raw or mixed waste is then pumped to the primary sedimentation basin. A Kenison flo nozzle on the incoming raw sewage line meters the waste water.

The trickling filters are designed to operate at a 30 MGAD rate of application. The loading per cubic yard is set very conservatively, namely 0.50 pounds B.O.D., to allow for possible inhibiting effects from the toxicity of some of the wastes and the oil emulsions that are always present. In addition to the normal phenols and cresols, varying amounts of high molecular weight phenols are present in the wastes. The effect of these as well as experience in their removal by biological means was completely unknown before this plant was installed. The light design loadings enable the waste treatment plant to operate at high efficiencies continuously to meet Incodel and State Board requirements.

FILTERS

The filters are of equal size—32' in diameter and 10' deep. Each contains 300 cubic yards of stone. Being of equal size, the units can be alternated from primary to secondary and vice versa, should operations require it. Interconnecting piping makes this possible.

The filters are designed to allow adequate air circulation. The filter slab was constructed on top of the ground and standard filter block under drains installed. This block was carried to the

edge of the slab and the ends left open. A concrete ring the diameter of the filter was poured on top of the tile as a base for the installation of cypress staves which formed the filter side walls. By this method an inexpensive and satisfactory filter unit that provided maximum ventilation was constructed.

The filter stone was carefully selected and screened trap rock. The specifications called for 100% passing a 4½" opening and 100% retained on a 3" opening. As received, about 10% passed the 3" opening and was retained on 2".

The filters are equipped with standard 4-arm reaction distributors designed to handle 350 gpm. Each filter discharges into a large sump which serves as a wet well for the pumps which return the filter effluent to the basin.

The primary and secondary basins are of conventional style, constructed of reinforced concrete 11' deep and providing retention periods of 1½ and 2½ hours respectively. They are equipped with mechanical sludge collectors, manually operated scum removal troughs and sludge draw-off valves.

The waste treatment plant area is level and, because of the high ground water level, all structures were kept as near the surface as possible. With the filters



Treated waste passes to the Delaware's main channel beyond the island in upper left corner.

set directly on the ground it is necessary to pump to the basins and to the filters.

CHLORINATION

Prior to discharge into the river, treated effluent from the secondary basin is chlorinated in a contact chamber having 60 minutes' retention. A Wallace & Tiernan solution feed, manually adjusted, gas chlorinator is used.

The State Health Department requires that plant wastes be discharged into the main channel of the Delaware River which lies on the far (West) side of Burlington Island. This island, directly opposite the plant site, is separated from the shore by an inner channel about 700 feet wide having a mean water depth of 22 feet. This meant laying a 3,300-foot pipeline under the inner channel and across the island. Pumping is needed to insure satisfactory flow conditions especially during periods of maximum high water. The outfall line is a 4" steel pipe with welded joints where it is under water and Dresser couplings on land.

Plant design provides for return of secondary sludge to the influent receiving well, from which it is delivered to the primary basin along with the raw waste. Primary sludge is returned to a sludge receiving well. The sludge is finally disposed of by dewatering it over a vacuum filter and burying the cake.

INITIAL OPERATION

The treatment plant was placed in initial operation in early winter using river water as the seeding medium. Trouble was experienced in developing bacterial growths on the filter stone due to the low temperatures encountered. When the circulating water temperature rose above 60° F. bacterial slimes developed rapidly. After these were well developed, plant wastes were turned into the system, starting with small increments in order to build up concentration slowly and provide time for acclimatization of the flora and fauna. This operation covered a period of about one month. Only a small amount of sloughing took place.

The plant wastes with the exception of the sanitary sewage contain zero nitrogen and very little phosphorus. In order to provide for a 20 to 1 carbon to nitrogen ratio, diammonium phosphate is added at the primary sedimentation basin inlet. This is computed on the basis of an average analysis of the preceding 24 hour average daily flow.

The treatment plant has now been in operation for nearly a year and a half and during this time the raw waste B.O.D.'s have ranged up to 1,700 ppm. Filter efficiencies have been between 79% and 95%, the lower values usually conforming to the low B.O.D. values. However, there are a good many results that show values between 86% and 94% with B.O.D. concentrations of 150 to 700 ppm. Average filter loadings per cubic yard vary between 0.15 and 1.35 pounds for the two units. The primary unit has shown loadings up to 2.55 lbs. and the secondary up to 0.50 lbs. per cubic yard. It is believed that the small reduction in the secondary unit is due to the low concentration applied and that with higher values this would approach the primary in efficiency. It is apparent that removals per yard here do not compare with high rate sanitary filters. This is probably due to the action of some of the toxic compounds present in the waste, especially the high molecular-weight phenols. The APHA (American Public Health Association) test has shown that pseudo phenols are present in the raw waste most of the time: These show up as a blue color in the alkaline distillate but do not show up in acid distillation. Since these do not appear in the treated effluent, they are probably removed by biological action. Furthermore, it is felt that in this plant the B.O.D. test is not a true measure of the actual organic matter removed by the filters. At times the dissolved oxygen and B.O.D. of the treated effluent, prior to chlorination, are both very low. It might appear that toxicity was present but this has been ruled out. It is believed that actually the B.O.D. is much greater otherwise the dissolved oxygen would be higher. Normally the dissolved oxygen

content of the final effluent prior to chlorination varies between 6 and 8 ppm.

During this period of operation, the facilities installed in the process buildings for oil collection did not satisfactorily remove the oil and it became necessary to add such facilities at the sewage list station. Duplicate oil separators, constructed to allow the separated oils to be easily skimmed, were installed. The collected oils are pumped into drums for final disposal.

The oil emulsions in the raw waste are now fairly low in concentration, averaging about 125 ppm. as ether extractable material. The treatment plant provides a reduction in these of better than 90%.

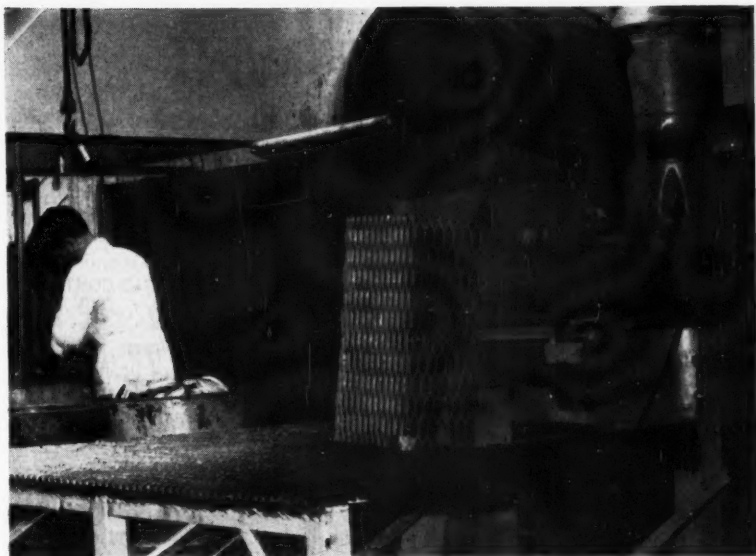
Balancing of the flows to and from the trickling filters required fairly close supervision by the waste plant operators. To eliminate the need for this close supervision, a mechanical control is being provided for balancing pump discharges to and from the filters. This will be accomplished in the flow to the filter units by bleeding a portion back to the basin effluent flume to maintain a constant level. On flow to the basins, the pump discharge will be throttled to maintain a constant level in the filter wet well. Bleed back and throttling will be accomplished by float actuated butterfly valves. The pumps will thus balance themselves. Since the treated effluent is split off the basin overflow weirs in both first and second stages, it has no effect on recycle flows.

Phenols in the raw wastes have varied up to 50 ppm. As outlined previously, pseudo phenols are usually present in the raw waste and have been found in the first stage effluent. They are usually removed completely in the second stage of purification. True phenol removal efficiencies vary from 90 to 99%. Taste and odor tests made in the laboratory on chlorinated samples of the plant effluent have shown none perceptible in dilutions of 500 to 1. Since the dilution of the plant waste in the river is several thousand times, there is no problem from these.

The sludge problem has been most troublesome, and it has not yet been completely solved. Even with good pretreatment with lime and ferric sulfate the oils present in the sludge cause considerable trouble in the vacuum filter by blinding the cloth. Since the oils present are germicidal, digestion is impossible. At the present lagooning is employed for disposal of the sludge until all of it can be handled in the filtration system.

The cost of operation is fairly high at this plant due to the large amount of pumping required. The cost of treatment will vary with the load handled. However, at the design value the cost is about 5.4 cents per pound of B.O.D. removed.

The experience to date indicates that the selection of treatment methods and design is sound. The plant has met stream requirements and has not produced tastes or odor problems in the river.



First step in extraction process is reduction of livers to "mud" in Rietz grinder (right).

Automatic Handling Marks

Vitamin Oil Extraction

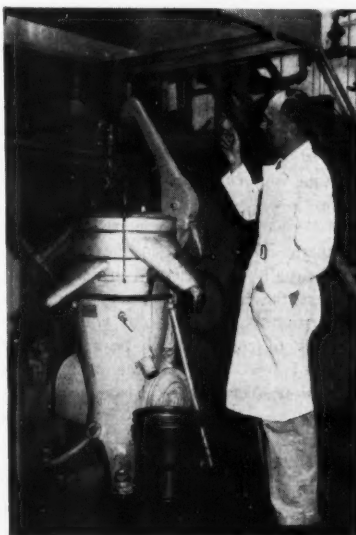
by W. J. GRANBERG,
Seattle, Wash.

WASHINGTON LABORATORIES, INC., processes 50,000 pounds of fish livers per 8-hour shift to produce oils rich in vitamins A and D.

EXTRACTION of vitamin-bearing oils from fish livers has been perfected by Washington Laboratories, Inc., Seattle, Wash., until that firm, organized in 1940 and now the world's largest producer, has reached a processing capacity of 50,000 pounds of liver per eight-hour shift. The method used, originated by the company, is an alkali digestion process, and production of the oils is a valve and push-button operation.

The livers, containing vitamins A and D, are obtained from dog fish, soupfin shark, cod, tuna, sole, halibut, and halibut viscera. They are gathered from stations in Alaska and British Columbia, to which fishermen send them, and are received frozen from California, Mexico and South America. In food fish, such as halibut, livers are a secondary product, while those of the shark are the primary objective of fishermen who are paid a total of about \$4,500,000 annually by the company. Livers are paid for on the basis of their vitamin content, which runs from 2,000 to 2,000,000 units per gram of oil. The percentage of oil to meat varies from 2 in halibut viscera to 70 in dog fish livers.

Livers are purchased and the finished oils are sold under the same assay system, a method developed by Bruce Sanford of



DeLaval centrifuge separates extracted and washed oil from water and other impurities.

the United States Fish and Wild Life Service. The price to be paid for livers is determined by this test, and during the production process the oil is subjected to it on four occasions in order to assure uniform quality. The test, known as the isopropyl ether method, determines both the percentage of oil in liver and its potency.

In the oil production process the livers are first pumped to a Rietz grinder, where they are reduced to mud. They then move into the digester tank, where they are kept just below the boiling point by a steam coil and agitated by a wooden paddle wheel. At this point soda ash and water at main temperature are added. The oil is drawn off from the digester tank, while the meat residue is taken off at the bottom as waste. The waste is assayed periodically to assure prevention of oil loss.

The oil is piped from digester to a wash tank, where it is agitated by a Lightning mixer while water at main temperature is added. As the oil leaves this tank, water at a temperature just below boiling is added. Entering a DeLaval centrifuge, the oil is separated from the water as the latter, together with any stray foreign matter, goes into the sewer line.

After being weighed in 50-gallon drums, the oil is run into a storage tank where a drying agent is added, after which it is assayed. From this tank, the oil goes to specie tanks for storage or directly to drums for shipping. Any necessary blending is done from the specie tanks. Demands for a clear and clean oil are met by running it through a Sparkler filter before it enters the specie tanks or shipping drums. Oils are often blended to meet specific customer requirements.

Pharmaceutical manufacturers and margarine firms are the chief buyers of these vitamin-bearing oils.



Oils are filtered (under tank at right) and blended to meet customer specifications.

How the RESEARCH DEPARTMENT Can Help in Patent Matters

by ALBERT S. DAVIS, JR.*

MANY DEPARTMENTS OF A CHEMICAL COMPANY are concerned with formulation of patent policy as well as the mechanics of patent application and defense. The research department has a clear responsibility to cooperate with others to insure validity of the firm's patent structure.

BY WAY of introduction, it is well to consider the benefits of patents to the research function of the modern chemical company.

The first and paramount importance of the patent to the research function is protection—protection of the inventor, or the person to whom he assigns his rights, against competition by others for a period of seventeen years. Anything else is really peripheral.

The second factor of importance stems from this same protection; it is the incentive to the carrying on of research which the patent, i.e., the availability of protection, gives. The research worker should bear in mind that the possibility of patents is frequently the economic factor which keeps his pay check coming in.

Another aspect of this patent incentive to research lies in the more personal reward to the man doing the work. It is elementary, of course, that public recognition of the value of work is a basic compulsion in getting the work done. People like to get published; and patents are an extremely satisfactory publication from the point of prestige.

In this connection more and more companies are coming to realize that a definite program of advancement in exchange for contributions to the company's success must make some provision for patents. Here you have three factors to consider: first, that in and of itself even an issued patent merely means that it functions as a matter of laboratory technique; second, that there is a genuine conflict of opinion, very real in its bases, as to whether an employer buys whatever genius resides in patentable invention at the same time he buys an employee's services, or should in equity regard such genius as demanding extra sporadic compensation; and third, that any plan for financial recognition of patentable invention may tend to divert the research staff from its primary occupation of doing research.

* Member of the New York Bar; resident attorney, Research Corp.; adjunct professor of administrative engineering, New York University.

There is much to commend a double system, in which major contributions, whether patentable or not, are recognized by promotion and salary readjustments,



"See to it that you have a witnessing routine."

and minor contributions are recognized by a cash award system, with patentability serving as a valuable criterion of whether the progress is so definite as to merit reward.

In and of itself, income for the corporation (sometimes applicable to the research department's activities) may fairly be said to be a patent possibility which is of genuine importance to the research function.

If the patent system you create for your company is concerned in the first place, as it usually will be, with protecting you against the inroads of competition, then realization of income from your patents by way of royalties will be a relatively minor factor. If you come into such a tactical position that you have to issue a license, you are going to formulate its terms not to make money, but to force the licensee into a disadvantageous competitive position.¹ Any honest evaluation of the possibilities of income, thus, must usually frankly admit that they are less important in the patent and research picture than people like to think they are.

PATENTS FOR SCIENTIFIC CONTROL

In the last thirty years the vast development of scientific progress in the field of pharmaceuticals, particularly with biologicals, has opened up an entirely new importance for patents with respect to the research function: scientific control.

Both the factual demands of making sure that what you have developed actually works, and the necessity of standardizing it, lead to the evolving of quality controls within your own laboratory.² Since your patents give you control over the process or product, they afford the point of departure for setting up a proper procedure of tests, a possibility recognized as early as Dr. Dick's work with scarlet fever.³

Your patents become functional with respect to scientific controls only when you impose them on other firms. There is a well-established body of thought that patents should not be used for this purpose. It argues that they were created to protect production from competition, and without thought of side issues.

I think that the argument may be historically correct, but that it goes too far. Patents were also created with the individual inventor in mind, but the system has necessarily had to adapt itself to the modern milieu of corporate industry.⁴ Conceding that any condition upon which a patent-holder may limit his relaxation of his monopoly must be lawful both in and of itself and in its effects, there is nothing either unlawful or impolitic about protecting the public.

What you want to watch out for is whether your scientific standards tend to create a secondary monopoly in your favor against your licensees and others. Thus a requirement for a test to be made on blood-agar plates should not also require that they be purchased of the licensor.

This scientific control angle will cross the track of the research department more often than not, because the research department will have worked out the technique of the tests, and because there is a steady tendency to turn research groups into control facilities.

CROSS-LICENSING

There is nothing immoral per se in licensing or cross-licensing; before they can be condemned, there must be an act

which is illegal expressly, by intention, or in effect. On the practical level that means, ninety-nine times out of a hundred, that you must do something which has been held to be a violation of the anti-trust laws, or deliberately try to suppress commerce or create a monopoly, or succeed in doing so.

Where the intention and effect are innocent—where a just man would say they are innocent—there should be less yielding to uninformed quasi-political criticism than is commonly the case today.

The trouble is that companies don't always stop at that point. They get into general cross-licensing arrangements, under which whatever one of them invents goes to the other. They then begin to make arrangements for prices and sales policies, and quality, and where they are to get raw materials, and the first thing you know they are really in trouble.

Cooperation on the patent and production side leads to cooperation of research departments in the solution of extraordinarily difficult or complicated problems. We have learned from the war the facility with which combined research upon one large problem can be carried on effectively and simultaneously by a dozen or more laboratories.

This, of course, is a natural successor and concomitant of modern team research in a single laboratory. Now admittedly it is a case of the tail wagging the dog to have patent considerations bring about such an alignment of research activities, but there are a number of cases where the tail has lifted the dog clear off the ground.

Patents, let me say, are also an extremely unimportant thing to the research worker. The business of a laboratory is the pursuit of new truths or the verification of old truths by new means. It is an excellent idea to have the staff of a laboratory so trained that they appreciate the importance of patents, patent possibilities, and patent procedures. It is a very bad idea to subordinate the conduct of their investigations to paper work imposed by a patent policy. It is perhaps worst of all to inculcate the idea that research is useful only if it results in good patents, or useful patents, or for that matter any patents at all. The end-product of research should be truth, not a complex factual situation showing provable compliance with section 4886 of the Revised Statutes.

POLICY FORMULATION

You must, of course, adapt patent policy and procedures to your company and its aim in life.⁵

Suppose you have a small company principally engaged on a local basis in the finishing-packaging-distribution end of the water-softener business, and that you decide to do some research towards a new softener with a slight chance of a

new detergent. One sensible business policy decision on the resulting series of problems would be along the following lines:

"We know the water-softener business, not thoroughly by any means, but we know it well enough to realize that we know a good deal less about most other things. It will require a fairly extensive line of credit to get going with production of the new softener if the research is successful. We know very little about detergents, except that at present it is



"Anti-trust troubles may stem from . . . trying to surround one's competitors by taking out patents which are never intended to be used."

a dog-eat-dog business principally conducted by large companies and sold over the radio and in Sunday supplements. While the Sales Department, just to complicate things, tells us we also should do research in water-softener apparatus so we will have a 'full line,' we realize that we are a chemical company by history and training, and that there isn't a single really good mechanical production man in the place. We therefore are going to concentrate our research efforts on the development of the new softener, and production and sale of it in the future if the work comes through. So far as the detergent angle is concerned, we will accept gratefully anything the research brings to us, but it will almost certainly be on the basis that some one else will have to take on its production and marketing, at least for a number of years. As for apparatus, we are not going to get into that unless somebody walks in some day with what amounts to a new concept pretty well worked out in all its applications. If he ever does, then we'll think about it again, on the basis of the general situation at that time."

Impliedly this is also a patent policy decision, because a decision has been made as to where the company is going to try to go. You actually have two groups of patent possibilities involved: on processes and products directed to the water-softener business, and on detergents. Of course, somebody may turn up something which is wide enough to cover both, and there undoubtedly will be peripheral results which don't particularly relate to either.

If the company is going to look to softeners as its bread and butter, then it wants all the basic and the useful pat-

ent production it can get. Most patentability situations on new work break down into the basic, the useful but not vital, and the possible, peripheral, or "interesting." So the executives are likely to say:

"We want every basic patent, whether on process or product, that we can possibly get. We also want every useful patent that we can possibly get. The basic ones will cover what we are doing; the useful ones will cover this less strongly, or will cover ways of doing it which we may not be quite ready to try, but which will protect us against direct competition and which we can fall back on if we have to. The possible, peripheral, and 'interesting' we aren't going to cover at all. In no case will we take out a patent which is so narrow that it serves no functional purpose."

Turning then to the detergents and the business decision which has been made, the executives might say:

"If there is going to be production, it will have to be handled as a matter of patent licensing. We are not expert patent exploiters, but judging possibilities by our own thought as to our own products, we can interest a licensee only on the basis of basic patents, not useful ones or minor improvements. Therefore we will patent only the basic material in that field, if it comes along."

This technique of forming patent policy is equally applicable to the typical large, wealthy chemical production corporation making both heavy industrial and fine chemicals at plants all over the country and abroad, run with efficiency and dispatch as a money-making proposition for its executives and stockholders. It would not have succeeded in business unless it planned where it wanted to go, and how it wanted to fight the competition, and its patent policy will not help it and is likely to hurt it unless the policy is arrived at with those ends in mind and to further them.

MANIPULATE WITH CARE

One thing against which one must constantly guard is the temptation to build up patent holdings designed for manipulation or to block out the competition rather than to protect. Given a large research laboratory, you will inevitably make a lot of "inventions," most of which have but little real functional relation to your business; given a lot of inventions, you can always get patents which for the most part have only a nuisance value; given a large and enthusiastic patent department, you will find that you are apt to file, as a matter of habit, on everything that comes out of the laboratory.

You will find that many anti-trust troubles stemming from patents (as opposed to those which have patents adventitiously mixed up with them) are due to one of three things: First, a policy of trying to surround one's competitors by taking out patents which are never

intended to be used, for the primary purpose of blocking competitors in their own field of endeavor without directly competing with them. Second, the releasing of such patents or their exchange with competitors accompanied by a parcelling out of activities of various kinds by fields of work, geographical areas, or the like. Third, the use of patents which are not being used to control competitors' prices, sources of supply, or quality.

When that happens you will also have either a monopoly or acts designed to accomplish or accomplishing restraint of trade (as indicated above), and when the Department of Justice gets after you they will not be content with a ruling that only patents so abused are not to be enforced—they will try to get rights for the public under the basic patents which you are really working.

INSURING VALIDITY

One thing more on a more practical level which should vitally concern you is whether, as a matter of patent law, your patents will be held valid when challenged in litigation. The mere issuance of a patent, though such favorable action by the Patent Office is supposed to carry with it a presumption of validity⁶, does not mean that a patent is likely to be held good when you sue on it.⁷ I have never seen a thorough statistical study of why patents are held bad, but I would say that among the chief reasons or cited grounds (not at all in the order of frequency) you will find:

- 1) that the courts set a higher standard of patentability than do either the Patent Office⁸ or the corporate patent solicitor;
- 2) research records do not adequately meet the demands of litigation;
- 3) large patent-holders tend to abuse their patent structure; and that
- 4) many jurists subconsciously dislike the monopoly concept inherent in a patent, especially in this day of distrust of the corporate system of capitalistic industrial economy.

Avoidance of much of this does not rest with the research division, except insofar as it is represented in forming corporate patent policy. There are, however, certain things which the research department can do to be helpful without ever getting into policy matters.

A good share of this centers around the problem of proof. When a patent is declared invalid for reasons of patent law, as distinguished from unenforceable for reasons of public policy, it is because there is a failure of proof that something was done, or that some particular person or persons did it, or that it was done at a particular time.

So see to it that your notebooks show that you prove what you do, as you go along, to an extent you consider foolish. Remember that we prove these things by witnesses, not by the unsupported word

of the inventor, and use the notebook chiefly as a useful future adjunct to the witnesses' oral testimony.⁹ It is absolutely necessary to keep a notebook, and it ought to be signed and dated every day; but see to it that you have a witnessing routine.

See to it too that there are outside records kept—ordering of special chemicals from the stockroom, requests for glass-



"A good share of most patent prosecutions is carried on by scientific talent."

blowers to turn out apparatus, requests for permission to release scientific papers—all the usual paraphernalia of corporate research. In other words, remember that the notebook and inventor are no good at all without corroboration, and see to it that you supply that corroboration.¹⁰

Now it's elementary to say that you should be able to tell from a notebook exactly how it was done, or exactly what was done. This ties in with the requirement that the patent specification set out the manner of practicing the invention so carefully that when it expires any person skilled in the general art can duplicate your work.¹¹ It is less often realized that in modern team research, or research involving several divisions of a corporate laboratory, we often have a very genuine problem of identifying the particular man with the particular work, and that the notebook is the logical whodunit in this type of literature.

When you plan your laboratory records you will be well advised to do it with the help of your patent solicitor and of an attorney who specializes in the trial of patent matters. After you have their recommendations, ask yourself for a little advice along these lines: If we keep our notebooks and records this way, are we going to continue to be research men or

will we become clerks? It is the easiest thing in the world to set up a system of records and record-keeping which is unexceptionable from the lawyer's point of view; if they don't do the job from the research point of view too, if they aren't scientific notebooks, if they or the system take too much time when you appraise the matter fairly, if they're fudged for legal effect—then they aren't laboratory records and you should have none of them.

As a research director or research worker you are going to know the precise status of the work in the laboratory, as to results, at all times and there must be means for giving this information to your patent solicitor in such a way that he will be able to determine the magic moment for filing. The easiest way to do this is to keep notebooks with a tear-off carbon for each sheet, route the carbons to the patent solicitor, and forget about it unless you happen to see something that you are certain should be called to his attention. A somewhat harder way, but one which seems to fit in better with the prevailing routine of laboratory report practice, is to have periodic status reports made up from notebooks, and route them on to the patent department. In essence, get the correct information to the solicitor and get it there with the least amount of paperwork, to save time and eliminate human error.

The hardest test of realizing your patent possibilities, though, will come when an application is under active prosecution. Lawyers are apt to say sardonically that the best inventions are made by patent attorneys. A good share of most patent prosecutions is carried on by scientific talent, for when the Patent Office tells you that your work lacks novelty because it shows only minor and obvious improvement, only a scientist can get at the real untruth of the statement. When the solicitor comes in and asks for help, then, he needs it and you should be ready, willing and able to help him. When he says he needs information "because", don't quarrel with the "because"; that's his job to decide upon and take care of.

Aside from never mistaking the issuance or probability of patents as constituting successful research, what should the research department do in its thinking about patent matters?

DEPRECATE PATENTABILITY

First, when you work a year on something and it turns out to be completely unpatentable, not because anyone else ever did quite the same thing, but because a mutton-headed, fumble-thumbed, unscientific, unrealistic, unprincipled court says that you *only* made a minor improvement, you are apt to feel that the operation was a success but the patient died. The patent possibilities are a by-product of research, an extremely valuable by-product, but not the thing which you principally pursue.

You are more apt to appreciate that than is the patent department or the board of directors; it is your job to get that appreciation over to them.

How can you do it? Don't allow yourself to be led astray; it is easier than you think. Emphasize in your contacts with the rest of the corporate organization that you are supposed to develop truth and applied truth, that patentable results are not the only way to prove such advances commercially, and that the technicalities of patent law and procedure frequently deprive genuine advancement of the artificial legal protection to which it is morally entitled. Control the reports of research division activities made to management so that they are couched in terms of scientific advance and commercial progress or promise, not patent numbers set opposite project numbers. Come to a gentlemen's agreement with the patent solicitor that he isn't going to pass the buck to you when he, through no fault of his own, can't get you the protection you morally deserve.

KNOW PATENT LAW

Second, see to it that your men and the members of the patent management committee have some understanding of basic patent law. A squad leader, or a man who is doing a responsible job of research, should know as much of the fundamentals of the patent system as he does (we hope) about the fundamentals of economics. As for the patent management committee, it must know something more than this of patent law, and a great deal more than this of patent tactics.¹² To attempt to manage any type of capital asset without knowing the functional rules which govern its economic life is foolishly hazardous.

Third, see to it that the men in your department cooperate thoroughly and freely with the patent department. Tersely, you can't succeed if your research workers are encouraged to feel that conferences with the patent solicitor are a waste of time or an imposition upon their good nature. When a conference is set up, the research worker should know and feel that it has a definite and important place in the company's life and in his own duties.

Fourth, and closely allied to this free cooperation, is the preparation and routine proper handling of research records already referred to.

In most cases, you will find that a thorough explanation, in scientific terms, of why your research teams are doing what they are can be extremely helpful to the patent department. The life of the patent solicitor, like that of the general lawyer or the scientist himself, is one of continuous education. It is not enough to throw a series of equations and test reports at him; you have got to explain them to him if he is to do a complete job.

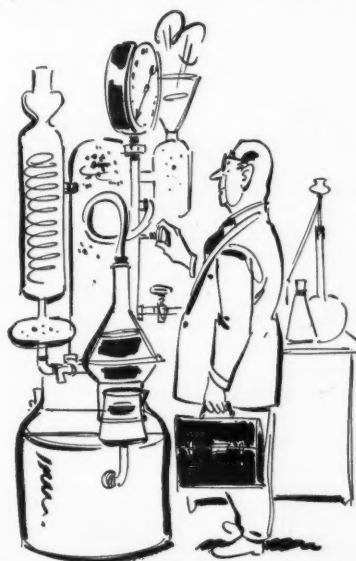
Sixth, since it is usually conceded that a demonstration of a technical fact in

concrete form is worth seven hours of explanation, you will occasionally find it useful to show your patent department what you are doing, rather than tell them.¹³

Finally, I think it should be up to you to do most of the literature searching. Chemists are notorious for reading all the prior art, occasionally even patents, before they start their work. If you will crib a précis of the published art into your notebooks or your routine reports of progress, you will save the patent department a great deal of unnecessary work; and, more than that, you will make it possible for them to develop their thinking in parallel to yours.

CHANGING PHILOSOPHY

I have implied that our patent law has developed, without too many textual changes, side by side with our industrial economy. Like any other form of law, it is expressive of the civilization in which it finds itself.¹⁴ It does not stand still, because it cannot. That being true, it is probable that during the next ten or twenty or thirty years of economic and



"Lawyers are apt to say sardonically that the best inventions are made by patent attorneys."

political pressure, and developing judicial, legislative and litigative forces, we are going to see more changes in our patent system. It is even conceivable that, along with decisions of courts, Congressional action, the Commissioner's management of the Patent Office, and the varying pressures brought to bear by the Department of Justice, our own patent management practices may play a considerable part.

Our most perplexing problem at this time is what may be called, for convenience, the problem of patentability.

Inherent in this is the fact that no definition of "invention," in terms of patent law, has ever been established.¹⁵

The problem of expense has long been a salient feature of the growing unpopularity of the patent system as a whole. Only a corporation (and a well-heeled one at that), can afford to do a good job on its patents. If the patent system is in practical effect only to be enjoyed by the wealthy, then why preserve it?

Finally, there is the vexing problem of conflict between the anti-trust laws and the patent law. The great trouble there is that, if we in fact are dealing with law at all there, it is law as read by conflicting expressions of economic beliefs. On the one side you have a legal right which is a monopoly, and which tends to breed other monopolies. On the other side you have groups devoted to destroying monopolies. On both sides you have excesses in the expressions of belief, and in the actions which implement the beliefs.

I have no solution, except to say that your own practices will in some part determine the extent to which the patent system is going to be undermined by over-application of the anti-trust laws. On the future emphases and varying fortunes within that battle will depend a great deal of your own personal security.

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2. Cp. M. W. Levy, "Utility, the Inverted Criterion," 30 J.P.O.S. (8) 592 (August, 1948).
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4. W. Hamilton, "Is Our Patent System Obsolete? Yes," 17 American Scholar (4) 470, at 471 (Autumn, 1948), in which Dr. Hamilton does an excellent job of mal-occlusion.
5. A. S. Davis, Jr., "Exploitation of Inventions" (American Chemical Society Patent Law Series, North Jersey section, New Brunswick, 1949—mimeo).
6. *Radio Corporation of America v. Radio Engineering Laboratories*, 293 U.S. 1, at 7 (1934).
7. The quickness with which courts seize on a reference not cited in the Patent Office to establish invalidity perhaps points a certain judicial uneasiness. See *Johnson Laboratories, Inc. v. Meissner Mfg. Co.*, 98 Fed. (2d) 937 (C.C.A.7, 1938).
8. Testimony of Commissioner Conway Coe, in Hearings before Committee on Patents, United States Senate, 75th Congress, 1st Session, on S.475 (G.P.O., 1937), might be read before and after G. V. Woodling, "Why the Patent Courts Should be Synchronized," *Machine Design* 93 (August, 1944).
9. For a typical case see *Saklatwalla v. Marburg*, 80 U.S.P.Q. 439 (C.C.P.A., 1949).
10. *Birmingham v. Randall*, 80 U.S.P.Q. 371 (C.C.P.A., 1949).
11. C. B. Hollabaugh, "Protection of the Results of Chemical Research," *Journal of Chemical Education* 321 (July, 1944).
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13. Cp. M. Taylor, "The Interview with the Examiner," 30 J.P.O.S. (8) 570, at 586-587 (August, 1948).
14. R. Pound, *An Introduction to the Philosophy of Law*, Ch. II (Yale Univ. Press, New Haven, 1922).
15. "The word 'invention' defies definition. All attempts to define it have failed. This is unfortunate, since the entire body of the law of patents is built around inventions." *Patent Manual for the Employees of the U.S. Department of Agriculture*, 6 (G.P.O. 1944).

Condensed from a lecture delivered at the Philadelphia College of Pharmacy and Science before the Philadelphia section, American Chemical Society.



In foreground building at Carlsbad, N. Mex., International Minerals & Chemical Corp. makes refined potassium chloride and potassium sulfate.

QUALITY BY THE TON

by E. E. WREGE and W. B. DANCY
International Minerals & Chemical Corp., Carlsbad, N. Mex.

NEW PLANT INTEGRATES chemical processes with mine and refinery operations to produce high-purity potassium chloride and potassium sulfate on a tonnage basis.

CAUSTIC potash producers using the mercury cathode cell require as their raw material a chemical grade potassium chloride of exceptional purity for optimum operation. Such a material is now being produced on a large-tonnage basis by International Minerals & Chemical Corp. in a newly-completed plant at Carlsbad, N. Mex. A typical analysis of product is as follows:

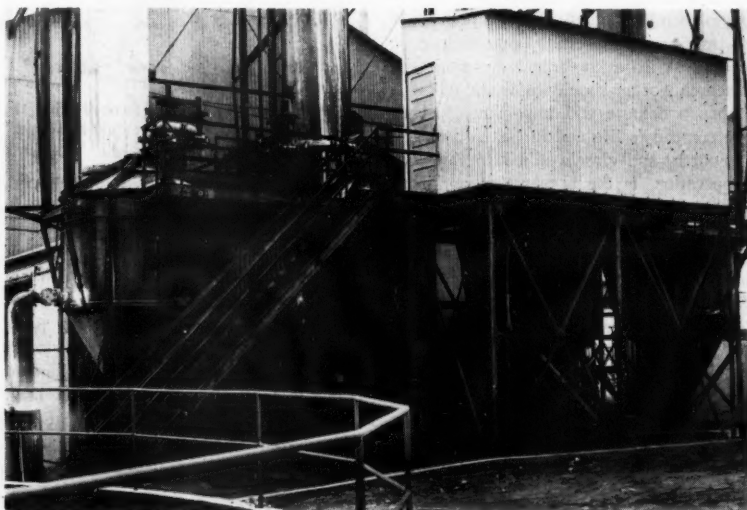
Potassium chloride	99.9+
Sodium	less than 0.01
Magnesium	less than 0.001
Calcium	less than 0.001
Sulfate (as SO_4)	less than 0.01
Bromine	0.015
Iron	less than 0.001
Heavy metals (such as lead)	less than 0.005
Copper	less than 0.00005
Nickel	less than 0.00005

Tonnage production of a material of this high purity is made economically possible at Carlsbad by taking advantage of existing large tonnage operations producing plant food grades of muriate of potash (60% K_2O or 95% KCl) and sulfate of potash (50% K_2O or 90% K_2SO_4). The muriate plant produces the raw material for the chemical-grade potassium chloride. It also receives back from the chemical-grade plant a re-cycle stream in which are approximately 90% of the soluble impurities contained in this raw material. The remainder of the im-

purities are eliminated by combining the potassium chloride process with a new process for producing potassium sulfate. This new K_2SO_4 process uses the total potassium chloride mother liquor as a raw material and produces an improved grade of sulfate analyzing 95% K_2SO_4 mini-

mum. Demand for the new sulfate is expected to come largely from the chemical industry, although it also offers a freight advantage to plant food consumers by virtue of its higher K_2O content.

Integration of the two new processes made possible considerable economy in



Submerged combustion evaporators. Three concentrate sulfate liquor; one dissolves muriate.

plant design, construction and operation. As shown on the accompanying simplified flow sheets, similar unit operations, such as heating, evaporation, crystallization and centrifugation are included in each process. In the plant layout, similar equipment of both processes has been located together for maximum economy and convenience. Actually, fewer personnel are required for the combined operations than were required for the old sulfate process alone.

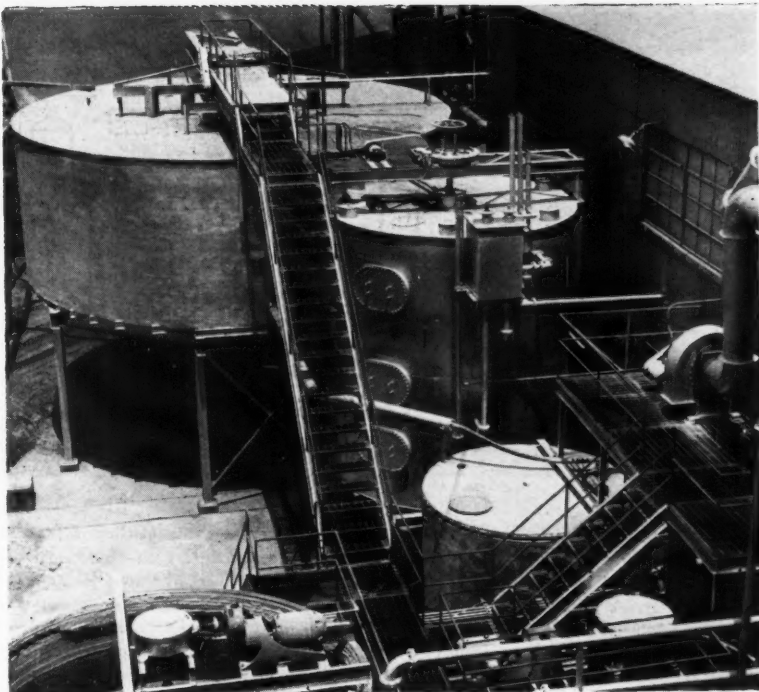
Capacity of the new plant is in excess of 22,000 tons per year of KCl and 60,000 tons per year of K_2SO_4 .

CHEMICAL GRADE POTASSIUM CHLORIDE

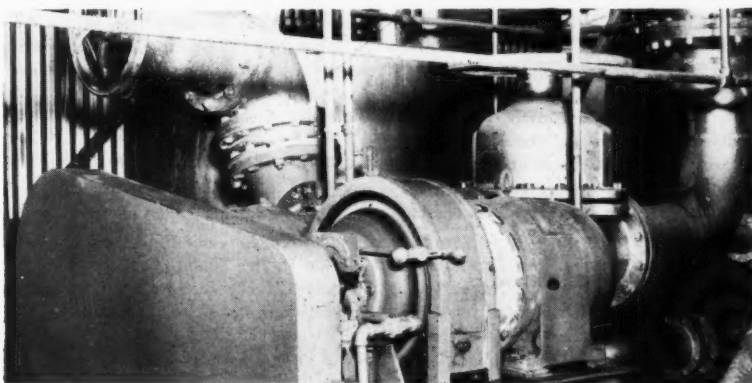
Plant-food grade muriate of potash (60% K_2O or 95% KCl) is the raw material used for the production of the high purity potassium chloride. It is produced as a flotation concentrate from sylvinite ore, the principal impurities being sodium chloride and langbeinite ($K_2SO_4 \cdot 2MgSO_4$), which are water soluble, and insoluble clay slimes. This raw material is cut from the sylvinite refinery stream after it has been centrifuged in preparation for drying.

The initial step of the potassium chloride process (see flowsheet) repulps the muriate in a recycled brine to permit its transfer to the chemical plant by pumping and to dissolve the major part of the soluble impurities, eliminating them from the process at an early stage. Solution of these impurities is attained by maintaining the recycled brine essentially saturated with KCl and markedly undersaturated with respect to sodium chloride and langbeinite. This is done by bleeding part of the recycled brine into the main flotation plant brine circuit where the potash values in the bleed can be fully recovered.

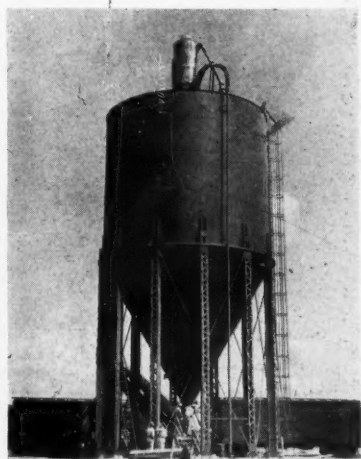
A Bird continuous, solid bowl centrif-



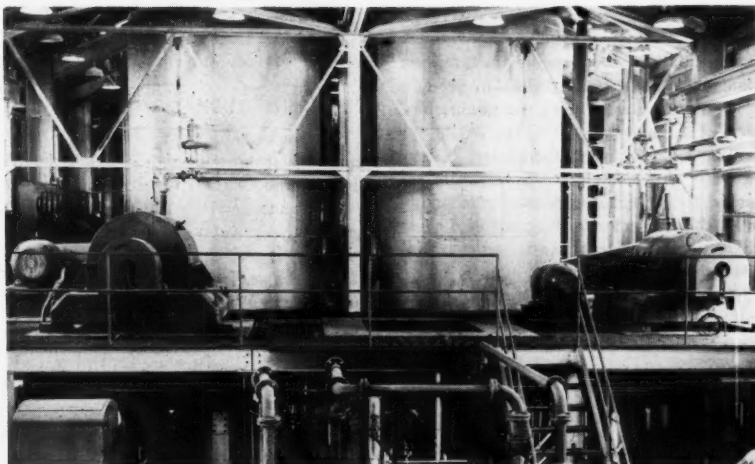
Insolubles in muriate feed to KCl process are removed in clariflocculator and tray washer.



Recirculating pump on KCl crystallizer showing fluid drive clutch for control of speed.

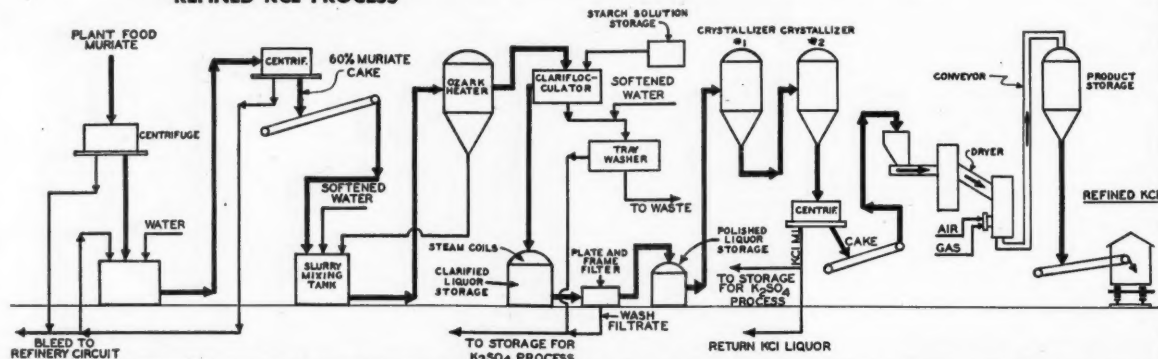


1,000-ton silo for storage of refined KCl.



Crystallizer section, with mixed salt and KCl crystallizers in back, centrifugals on balcony.

REFINED KCL PROCESS



ugal separates the repulped muriate from the recycled brine. This machine was selected for its washing efficiency and large capacity. A displacement wash effectively removes entrained brine, producing a cake containing less than 10% of the soluble impurities present in the starting muriate. The quantity of wash water used is balanced against the quantity of water bled, as brine, to the flotation plant circuit.

An unusual design feature of the Bird centrifugal installations in the new plant is the use of a floating foundation mounted on a rigid base by means of hinged pin joints. This design has been remarkably successful in damping out undesirable vibrations and was a more economical installation than the standard mass concrete foundations.

SOLUTION OF MURIATE

Solution of the muriate cake from the centrifugal in zeolite-softened water is accomplished in an Ozark-Mahoning submerged combustion unit burning gas as fuel. The ratio of water to muriate is controlled by a Foxboro transmitter linked to a Merrick automatic weigher, the transmitter controlling the rate of water addition to a preliminary mixing tank. This ratio is controlled to produce a solution saturated with potassium chloride at a temperature 4°C below the operating temperature of the heater. A temperature differential of this order is required to prevent crystallization of potassium chloride prior to the controlled crystallization step. Heat transfer efficiency of the submerged combustion unit is above 90%.

CLARIFICATION

Following solution of the muriate, the insoluble slimes are coagulated with starch solution in a Dorr clarifloculator. The starch solution is prepared by boiling starch at 2% weight concentration in potassium chloride mother liquor. Starch

treatment increases the settling rate of the insolubles, producing an exceptionally clean overflow. The overflow is subsequently polished by a precoated plate-and-frame filter to insure 100% clarity.

The clarifloculator underflow is treated for maximum recovery of potash values (contained in the brine) in a Dorr three-compartment tray washer. The diluted brine overflowing the tray washer contains practically all the potash values and is by-passed to the potassium sulfate section of the plant. The tray washer underflow, containing a negligible quantity of potash, is discarded.

CRYSTALLIZATION

A two-stage vacuum crystallizer cools the clarified hot liquor to 25°C, crystallizing approximately one-third the potassium chloride in the liquor. Vacuums of 2.5" Hg and 0.7" Hg absolute are maintained by multistage steam jet ejectors, boosters, and barometric jet condensers. An interesting design feature is the use of fluid drive clutches on the recirculating pumps to provide flexible regulation of the recirculation rate for attainment of desired crystal size. The crystallizer bodies and recirculating and transfer lines are rubber lined to prevent contamination.

CENTRIFUGING & DRYING

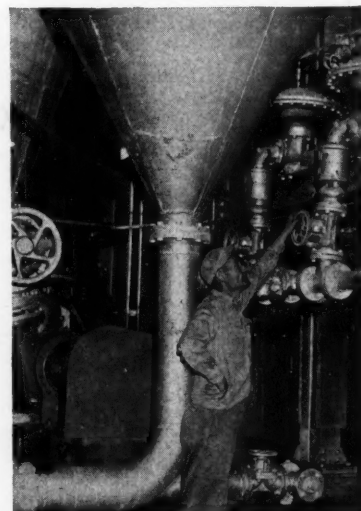
The potassium chloride crystals are separated from the mother liquor by a Bird continuous centrifugal and are given a displacement water wash in the same operation. A counter-current rotary dryer dries the centrifuged cake to less than 0.1% moisture. Indirect heated air is used as the drying medium as the moisture content of combustion gases produced from natural gas is too high to keep the dried product in a free-flowing condition. The dried product is dispatched by air conveyor to the storage silo.

The potassium chloride mother liquor plus wash liquor is not recycled for optimum recovery as in most recrystal-

lization processes but is transferred to the potassium sulfate process where full recovery is credited. This total bleed of all the mother liquor from the potassium chloride process eliminates the possibility of contamination of the product through build-up of soluble impurities. Thus the grade of potassium chloride produced approaches "chemically pure" specifications.

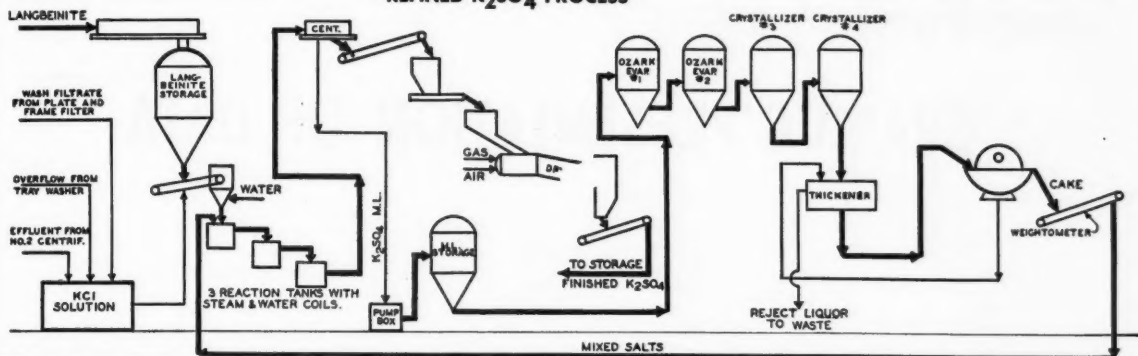
IMPROVED GRADE POTASSIUM SULFATE

Mother liquor from the potassium chloride process, langbeinite ($K_2SO_4 \cdot 2MgSO_4$), and water are the raw materials used in the new process for making an improved grade of potassium sulfate. Salts recovered in an evaporation-crystallization step are recycled to this step. These recycled salts are composed mainly of potassium chloride with some leonite ($K_2SO_4 \cdot MgSO_4 \cdot 4H_2O$). At least three interconnected reaction tanks are used to



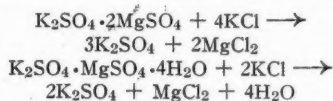
Pumps to remove KCl slurry from crystallizers.

REFINED K₂SO₄ PROCESS



minimize short circuiting of the raw materials and to provide necessary retention time of 3 to 4 hours for complete reaction.

For optimum recovery, the quantities of raw materials and recycled salts are controlled so that the mother liquor, after the reaction, is almost saturated with respect to potassium chloride and leonite. The reactions which occur are as follows:



Bird continuous centrifugals are used to separate the crystallized potassium sulfate from the mother liquor which contains the magnesium chloride formed in the reaction. After drying, the potassium sulfate is conveyed to storage.

EVAPORATION-CRYSTALLIZATION

Potassium sulfate mother liquor, being saturated or at near saturation with re-

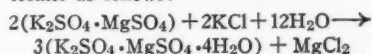
spect to three potash salts (K₂SO₄, KCl, and K₂SO₄·MgSO₄·4H₂O), contains considerable dissolved potash. Serious losses of potash are avoided by processing the mother liquor, after separation from the potassium sulfate, in an evaporation and crystallization step.

Ozark-Mahoning submerged combustion evaporators, interconnected for series operation, concentrate the mother liquor. Evaporation control is based on the concentration of sodium chloride, the principal impurity in the raw materials, dissolved in the mother liquor. The mother liquor is concentrated to a point where, on cooling to 30° C., the remaining liquor is just short of saturation with sodium chloride. Over-evaporation to a point where sodium chloride is returned with the recycled salts is carefully avoided as this salt has a deleterious effect on process recovery.

Evaporation is controlled by maintaining a constant boiling point rise. A bulb thermometer measures the temperature of

condensed saturated steam; another measures the temperature in the final evaporator. The gas flow is regulated to maintain a constant differential between the temperature measurements.

A two-stage vacuum crystallizer, similar in design to the KCl crystallizer, cools the hot slurry discharged from the Ozark units to 30° C. Additional potassium chloride crystallizes, and the langbeinite formed in the evaporators, being unstable in the presence of KCl below temperature of 63° C., reacts with some of the potassium chloride to form leonite as follows:

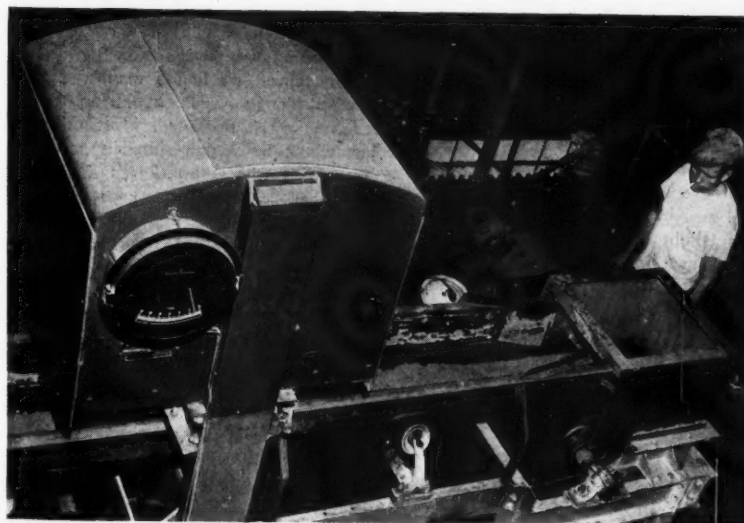


THICKENING & FILTRATION

A Dorr thickener is used to partially separate the solids from the crystallizer discharge slurry, the underflow being filtered on an Oliver salt-type rotary vacuum filter. The solids (recycled salts) are conveyed to the reaction step and the filtrate is returned to the thickener for recovery of solids which pass through the filter screen cloth. Fairly concentrated magnesium chloride liquor overflowing the thickener contains 8% of the potash values in the raw materials fed to the process. Several processes for recovering useful magnesium compounds from this liquor are being investigated on laboratory and pilot plant scale.

MATERIALS OF CONSTRUCTION

Ozark evaporators and tanks are mild steel, Gunit lined. KCl crystallizers are rubber lined, and the mixed salt crystallizers are of mild steel. Bird centrifugals are mild steel with conveyor surfaces hardened with Stellite. The Oliver filter and KCl drier are Monel and Monel-clad steel, respectively, the sulfate drier being mild steel. Iron pumps and piping are used for cold solutions and slurries. Ni-Resist, pumps and rubber lined piping are used for hot solutions and slurries.



Weightometer measuring muriate and controlling water to maintain correct concentration.

Some Pointers on GRAPHIC PRESENTATION OF DATA

by J. V. STURTEVANT
Carnegie-Illinois Steel Corporation
United States Steel Corporation Subsidiary
Pittsburgh, Pa.

DO YOU USE charts in your reports, sales presentations, department records? Here are some ways to make them say more and say it better.

IN VIEW of the well-recognized ease with which essential relationships can be grasped when presented in a pictorial manner, it is not surprising that the graph continues to grow in popularity, for it is essentially a picture. When it is not only soundly planned, but well executed and described, we can properly expect its recipient to appreciate the significance of the points we wish to convey. The importance of accomplishing this aim is better appreciated when we consider that many industrial decisions, often involving large sums of money, are made on the basis of charts purporting to show certain industrial or technical relationships. Certainly such charts should be prepared in a manner free of ambiguity and misdirection.

1. Adopt viewpoint of the reader.

In planning the chart, it seems clear that we should adopt the viewpoint of the expected reader. We should ask the question: For whom am I preparing this chart? Is that person familiar with the general situation? With this particular problem? With the trade terms and technical symbols to be used? Has the chartist the right to expect that the reader will be familiar with this *type* of chart? We often fail to appreciate that other individuals, having their own problems, are less conversant than we with the details of our work.

2. Settle on purpose of chart.

It is too often that we draw charts with only the vague thought that "it would be a good idea to plot the data." *Why?* No doubt, there is a good reason. Then let us have that reason in mind from the beginning in order that the design of the chart will be aimed toward that specific purpose.

3. Determine expected environment of finished chart.

In advance of making the chart, ques-

tions of this nature should be settled: How will the chart be presented? Will it be attached to a letter or a memorandum or bound in a report folder? Will it be presented with verbal explanation or without such explanation? Will it be accompanied by other charts with which it might become confused?

The answers to these questions should influence the chart design. If presented alone without opportunity for explanation, the chart should be so simple and clear and carry such self-explanatory notes and legends that neither its arrangement nor the significant aspect of its message can be misinterpreted. When it is accompanied by an explanatory text, particular care should be taken in the arrangement of the report lest the reader's interest be lost in his necessity to flip the pages back and forth.

4. Determine required quality of reproduction.

Because of its bearing on chart design, the question should be decided in advance whether the chart will be used in its original state or reproduced in the form of several or many copies. If copies are to be made, the quality needed in the original chart will depend on both the method of reproduction and the final use of the copies. When the chart is to be reproduced in smaller size or even in full size by one of the less exact methods, slight irregularities in its state of mechanical perfection will be of minor importance. On the contrary, when the reproduction is to be accomplished in full or greater size by one of the more precise methods, the evident contrast between the neatness of the background and any mechanical defects in the chart can do much harm to the psychological effectiveness of the presentation.

5. Review, select and arrange data.

Prior to the drawing of the chart, it is desirable to review the available data from the viewpoint of its suitability for

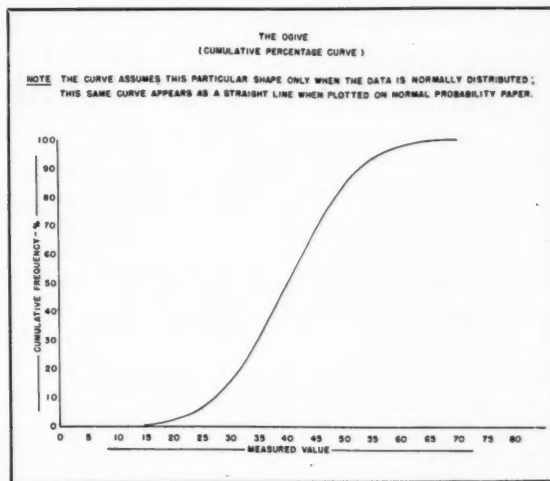
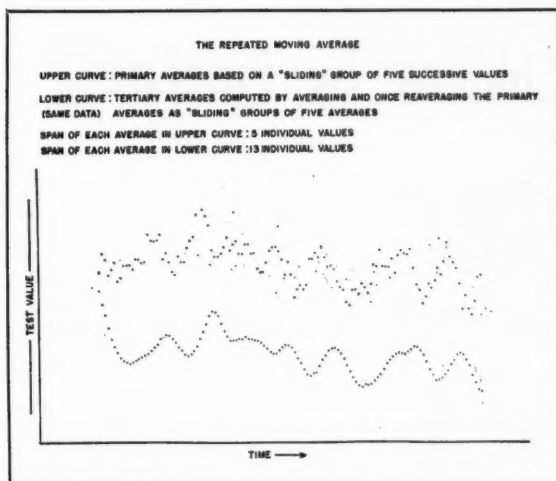
the intended purpose. This is in no wise intended as a proposal to "edit" data in accordance with a preconceived opinion, but it is the chartist's clear responsibility to make certain that the ultimate reader of the chart does not become confused or misled by the inclusion of unreliable or impertinent data. It is in the next step, involving the arrangement of the data in rational sequences or groups, that the chartist's understanding of both the problem and the reader's viewpoint is subjected to the severest stress, for a thoughtless, haphazard arrangement can more readily alienate the reader's interest than any other fault.

The sequence of presentation in the chart, as well as the manner of grouping, should closely follow the sequence used in the explanatory text. It is particularly important that the arrangement be clearly aimed toward the one principal point which constitutes the chartist's objective. It is far too often that he succumbs to the temptation to design the chart in such a manner as to emphasize some point which, though significant and important, is clearly a "side-issue" with respect to his initial problem.

6. Design chart with attention to detail.

Reaching the matter of actual design of the chart, we find a number of important details which, appearing trivial, are too often neglected. Most of these contribute to clarity, simplicity and the ease with which the chart's significant point can be grasped.

a. Explanatory Devices: While it is generally recognized that the chart should carry a title as well as various explanatory notes and legends, the manners in which these are both worded and positioned should be given much more than their customary attention. Failing to recognize that the reader of the chart may be less familiar than he with the details of the problem, the chartist is likely to assign a title which is too general to indicate why this particular chart is being presented. In such case, a sub-title might well be included for this purpose. In order to facilitate the finding of a given chart



among a series, some thought should be given to the positioning of its identifying number or letter.

The legends describing the units in which the axes of the chart are scaled should be both clear and complete. Certain devices, such as bars, dotted lines, symbols and colors, should be explained by notes appearing on the chart either in proximity to their respective devices or in the sequence with which the reader can logically be expected to encounter them. In using colors, the possibility that the reader may be color-blind should be considered. When multiple scales are used, care should be taken that these are arranged in a logical sequence. Clear distinctions should be made between different sections of the same chart or between different charts appearing on the same page. Explanatory notes or legends applying to only one section of the chart should be clearly designated as such.

In order to avoid a possible "wandering" of the reader's attention, it is sometimes desirable to guide his study of the chart by an explanation which will lead him from point to point in a logical sequence. Such an explanation would preferably appear on the face of the chart but, owing to the exigencies of space, it may sometimes prove desirable to include this in an accompanying text so arranged that the chart and text are simultaneously in the reader's view. The "blocking-off" of certain significant areas or features of the chart is often helpful.

The suitability of each of the various devices to be used in the chart should be considered in detail. Some of these, particularly the Greek letters, may be unfamiliar and therefore confusing to the reader. Difficulty in understanding the chart can arise from such apparently trivial matters as the similarity of "dot-dash" and "dash-dash" lines when these are not precisely made or reproduced. The crowding or "criss-crossing" of several lines on a chart can render it meaningless to a degree much better appre-

ciated by the reader than by the chartist to whom each line appears as a familiar and therefore distinct path.

b. Scaling of Axes: The magnitudes of the units in which the chart axes are scaled should be of special concern. It is particularly important to avoid the psychological device of choosing a scale ratio so small that differences of actual significance are unduly minimized in the eyes of the reader. When the available space permits, it is a usual tendency to choose a scale ratio which permits plotting the data as precisely as possible; the chartist should not, however, thus be led into indicating a degree of precision greater than that actually existing. The scale unit chosen should be such as to facilitate the interpolation of the values of points plotted at levels between those indicated on the axes. When it is necessary to use different scale magnitudes in different regions of the same axis, the point of change should be clearly shown, preferably by means of the double zig-zag line extending across the width or along the length of the chart. Charts are occasionally seen wherein the ordinate is scaled with magnitude increasing in the downward direction. While this practice is sometimes necessary, or desirable, its psychological disadvantages should be given due consideration.

7. Three types of charts often overlooked.

a. The Repeated Moving Average: While the simple moving average, based on a "sliding" group of values, is commonly used to smooth out fluctuations in data, repeated reaveraging of the moving average will be found to have a surprisingly strong effect toward further smoothing with attendant psychological advantages in presentation of trends.

b. The Ogive: The ogive is simply a cumulative percentage curve. It is particularly useful in that it provides an immediate answer to the question: How large a percentage of a product or of a

group of values can be expected to occur either above or below any given level of the independent variable? Thus, there is provided a ready means of determining either (1) the minimum or maximum limit of the independent variable when the allowable per cent occurrence beyond the limit has been stated or (2) the expected frequency of occurrence when the limit has been stated. In plotting this type of chart, the independent variable is customarily scaled on the abscissa. If it is desired to know the frequency of occurrence below any particular level of the independent variable which might later be selected, the frequencies or percentages recorded for the successive levels of the independent variable are cumulatively plotted on the chart beginning with that representing the lowest value of the independent variable. Conversely, it might be desired to read from the chart the frequency of occurrence above any given level of the independent variable. In this case, the summing of the successive frequencies should start with that representing the highest level of the independent variable. In some cases it is found desirable to present both of these curves on the same chart.

c. The Scatter-Diagram: For some reason unknown, statisticians in general appear to have assigned the scatter-diagram chart to a lowly position among their statistical tools. Yet this method, considered from a strictly practical viewpoint, is probably one of the best tools we have today for seeking the causes of defects in manufactured product. The two axes of this chart are conventionally arranged and respectively scaled with the units in which are expressed two of the variables believed to affect the product quality. The frequencies of "good" and "defective" items of product are accordingly plotted in the body of the chart using different colors or symbols. Thus, a predominance of one color in a particular region of the chart indicates a "joint-effect" of the two variables.

How To Move Liquid Chlorine by Pipeline

by W. H. TELL
Shell Chemical Corp., Deer Park, Texas

A TWO-MILE PIPELINE moves liquid chlorine from Diamond's chlorine plant to Shell's synthetic glycerine plant.

ONE problem confronting designers of Shell Chemical Corp.'s synthetic glycerine plant at Houston, Texas, was the transportation of large tonnages of chlorine from Diamond Alkali Co.'s plant approximately two miles away. There were two alternative means: conventional tank car transportation or a two-mile pipeline connecting supplier and user.

Although an economic analysis of these alternatives indicated that the pipeline was the more satisfactory solution, a further question had to be answered: Were the inherent hazards in transporting chlorine by this method too great to allow its use? The combined engineering groups of Shell and Diamond pooled their knowledge and operating experience and decided that the problems involved in construction and operation were not insurmountable.

"Engineering" the line unearthed several more specific problems involving safety considerations, physical design, construction materials and methods, and pre-operational testing.

SAFETY

The line had to be located where it would be the least hazardous to personnel and property in case of a leak or rupture. Not only was it routed through an uninhabited area, but it was also elevated for protection against mechanical mishaps. An additional advantage of the latter is that it facilitates inspection, and permits more rapid dissipation of chlorine should a leak occur.

Since liquid chlorine has a large coefficient of expansion, installing adequate means of protecting the line from developing excessive hydrostatic pressure was the other major safety factor to be considered. A dual rupture disk system was installed at the Shell end of the line. This is connected via a relief manifold to the vapor space of the receiving storage tanks for release of the chlorine. The rupture disks are installed in parallel to permit replacement while providing constant protection to the line.

The storage tanks are horizontal pressure vessels equipped with safety valves that vent directly to the atmosphere. To protect the relief valves from corrosion, a silver rupture disk is installed between each one and the tank. For safety, the



smallest nozzle installed on these storage tanks is 2" in size.

DESIGN

The design involved problems for which accurate physical design information was lacking. Moreover, the question of the extent of vaporization that would occur during transfer required careful evaluation. While thermal variations required a satisfactory design to cover ambient temperatures ranging from 30° to 130° F., sizing of the line had to be a compromise between a size that would contain the minimum inventory of liquid chlorine and one of sufficient diameter to allow for intangibles such as vaporization.

The degree of internal corrosion in the pipeline and its cumulative influence on capacity were discounted, because previous operating experience indicated that with dry chlorine this was insignificant.

The main section of the line was constructed from 3", Schedule 80, all-welded seamless steel pipe with only two flanges in the system. These flanges, of the ring-type joint, are installed at each end of the line. The line is supported by hangars which permit expansion or contraction without stressing. In addition, expansion loops are provided.

The chlorine is transferred by a blow-case system. The amount to be delivered is first accumulated in weigh tanks and then pressured by dry air from the weigh

tanks to the pipe line. Normally the available pressure drop is 20-30 psi and the temperature of the liquid entering the line is 10°-20° F. As this temperature is considerably less than the dew point of the surrounding air, substantial icing of the first part of the line results. This, however, is not expected to accelerate external corrosion as long as the surface is protected adequately by frequent painting.

OPERATION

Actual operation indicates that thermal absorption during the summer is greater, and in the winter less, than predicted. The pressure drop, instead of attaining the design value of 10 psi at a transfer rate of 8½ tons/hour, approaches 45 psi during the summer months for a transfer rate of 6 tons/hour; at essentially the same pressure drop, a transfer rate of 10 tons/hour is achieved during the winter months.

Before placing the line in service, a hydrostatic pressure of 400-600 psi was maintained for several hours to test the mechanical strength of the line and welds. The value of this procedure became evident when the existence of several sections of lap-welded pipe was revealed by their failure during the test. Since it was of the utmost importance to detect porous welds prior to placing the line in service, the system was pressured with air and chlorine gas to 100 psi and each weld then checked with soap solution and ammonia water.

The line was dried by passing dry air (dew point -50° C.) through it at a rate of 100-150 cfm. Ten days were required to attain a substantially constant dew point of -40° C. at the terminal end of the line. At this time the line was accepted as serviceably dry, and liquid chlorine was turned into the system June 1, 1948.

During initial operation some difficulty was experienced that had not been fully anticipated: design flow couldn't be attained with the available pressure drop because miscellaneous foreign material (mill scale, welding rods, etc.) plugged valves. To prevent such a recurrence, a 6" x 15" knockout drum was installed at the far end before the valve manifold. Since its installation no plugging of block valves has been experienced and line capacity has increased from 5-7 tons/hour to 8-10 tons/hour at comparable conditions.

AMMONIA

Part II: Cost of Production and End-Use Pattern

by WILLARD C. COPE*
Washington, D. C.



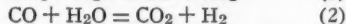
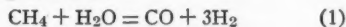
COST OF PRODUCING AMMONIA in a new plant using hydrogen from natural gas is about 10% less than in one based on hydrogen from coke . . . Actual production cost in a new plant is appreciably below those of existing plants primarily because of lower depreciation costs . . . Fertilizers took over 60% of 1948 production.

MODERN synthesis of ammonia in the United States is based almost wholly on hydrogen from water gas or reformed natural gas. A minor exception is the use of by-product hydrogen from the electrolysis of salt. In Europe, however, the electrolysis of water and fractionation of coke-oven gas are important sources. Which method is used to produce the hydrogen depends on plant location, available power and raw materials.

RAW MATERIALS

Hydrogen from Natural Gas. Prior to World War I natural gas was the source of hydrogen for only one plant. Today it is a raw material for 40 per cent of U. S. ammonia capacity and will account for more as new units begin operation.

Natural gas, mostly methane, reacts with steam at 725° C. in the presence of a catalyst (small cylinders of diatomaceous or other earth material supporting metallic nickel) according to the following reactions:



In a typical operation, approximately 22,000 cu. ft. of natural gas are processed per ton ammonia produced. About 93% of methane is converted with a process efficiency in the step of slightly less than 95%. In the initial reaction of steam and methane, the volume of gas increases to

97,000 cu. ft. Effluent gases from the primary reactor or reformer are then mixed with air or flue gas or both. This mixture reacts over a nickel catalyst at 900° C. in the secondary reformer, completing the conversion and adding nitrogen required for the synthesis. The final step in the preparation of synthesis gas is the reaction of carbon monoxide and steam in the presence of an iron oxide catalyst at 540° C.

At this point, before purification, the gas has this approximate composition:

Gas	Per Cent
CO ₂	15.5
CO	3.5
H ₂	59.7
CH ₄	0.9
N ₂	20.3
O ₂	0.1

114,000 cu. ft. are required per ton ammonia.

This gas is then compressed in stages of 25, 80, and 240 psi. The primary compressors employ intercoolers between compression stages. At 240 psi the gas is routed to vertical water scrubbing towers where 99% of the carbon dioxide is removed.

The gas is then compressed to 600 psi,

then 1,800 psi, with intercooling. The mixture is then admitted to the bottom of a tank containing copper-ammonium formate solution at 0°-5° C. where carbon monoxide and residual carbon dioxide are removed, and thence it goes to a caustic soda scrubber. The final gas mixture contains 73-74% hydrogen and 25% nitrogen with a volume of approximately 91,000 cu. ft. per ton ammonia.

Synthesis gas is finally compressed to 4,500-4,800 psi and sent to the ammonia converter. The converter is of special design, operating at 4,500-4,800 psi and at 510°-525° C. with an iron catalyst. The reaction is exothermic and once started, maintains its own reaction temperature, but in case the temperature should drop, an electric heater coil is provided. Twelve to fourteen per cent ammonia is produced per pass. Ammonia is recovered by water cooling and ammonia refrigeration and after weighing, is sent to storage.

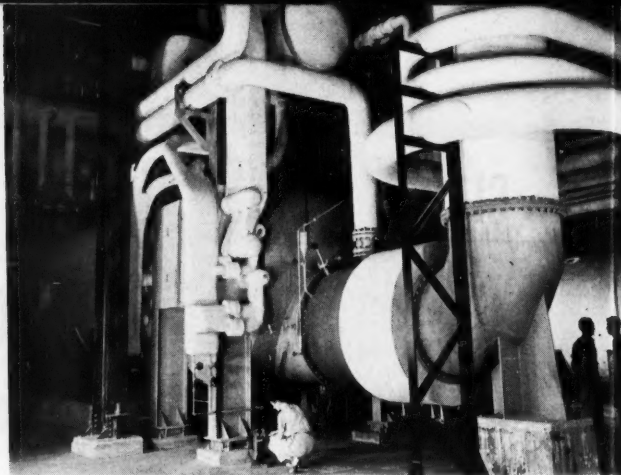
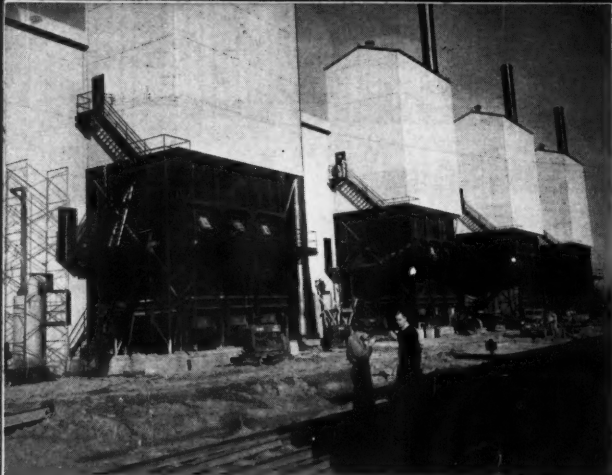
The process may be modified by using higher or lower pressures, different conversion temperatures and substitution of the Girbotol or other process to remove CO₂ from the make-up gas. Power and heat require approximately 78,000 cu. ft. of additional natural gas per ton of ammonia produced.

Hydrogen from Coke. Coke is used as a source of hydrogen by E. I. du Pont de Nemours & Co. at Belle, W. Va.; Allied Chemical & Dye Corp. at Hopewell, Va., and South Point, O.; Tennessee Valley Authority at Muscle Shoals, Ala., and the Government plants at Henderson, Ky., and Morgantown, W. Va. In Canada, it is used by Welland Chemical Works, Ltd., Welland, Ont., and by Consolidated

REPRINTS

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* Mr. Cope has been connected with industrial nitrogen since 1906. First employed by the Army, he was later with the Bureau of Mines and then Du Pont. During World War II he served with WPB and then the Appraisal and Valuation Division of WAA.



1. When gas is first reformed it forms mixture of CO_2 and H_2 .

Waste heat boilers recover the heat liberated in reforming unit.

Smelting and Refining Co. at Trail, B. C. The coke process is used also in Great Britain and on the continent because of lack of natural gas, although coke oven gas and electrolytic hydrogen processes are sometimes employed.

First, water gas is produced in the typical blue gas plant which may be operated to give a desired quantity of producer gas at the same time, or the producer gas may be formed in a separate gas-producer plant. In both cases, the composition of the semi-water gas that results is such that when it has been converted with steam, and impurities have been removed, a nitrogen-hydrogen mixture of correct proportions remain.

Typical semi-water gas has the following composition:

Gas	Per Cent
CO_2	5.5
CO	34.5
H_2	37.5
CH_4	0.5
N_2	22.0

The gas mixture is purified by removal of hydrogen sulfide and mixed with steam to convert carbon monoxide to carbon dioxide by reaction over iron oxide. Carbon dioxide is removed by water scrubbing and synthesis is completed as described under the natural gas process.

Ammonia from coke is more costly than that produced from natural gas because of the higher cost of coke and coal used for power and more expensive equipment required for producing the make-up gas. However, advances have been made in the art of water gas production by utilization of tonnage oxygen and changing the conventional intermittent gas manufacturing equipment to a continuous producer process. By reacting 95% or lower purity oxygen and steam with coke, a gas mixture of hydrogen, carbon monoxide and nitrogen is formed that is in the correct proportions for ammonia synthesis gas after the carbon monoxide is converted to hydrogen by reaction with steam.

Wright, Barclay & Mitchell (*Ind. & Eng. Chem. Vol. 40, p. 592, April 1948*)

have reported a saving of 30% on coke and 56% on steam requirements in producing water gas with tonnage oxygen instead of air. For 100,000 cu. ft. water gas, 20,000 cu. ft. oxygen are required, which at \$5.00 per ton is equivalent to a cost of \$4.50 per ton of ammonia. To off-set the oxygen cost, there is the saving of \$6.70 on coke, steam, and maintenance and labor costs. Fuel cost may be even lower than shown above as it is possible to use lower grades of coke than the two-inch coke now required in conventional gas production equipment. Actual cost reductions will be determined by the Belle, W. Va., plant of E. I. du Pont de Nemours & Co. Ammonia Department where a 360-ton-a-day oxygen plant is now under construction. Tonnage oxygen is estimated by Downs (*Chem. Eng. p. 113, Aug. 1948*) to cost \$3.67 to \$7.02 per ton, depending on the size of the plant.

Hydrogen from Coke Oven Gas. One plant employing this process is in operation in Britain and a number were erected on the continent prior to World War II. The process consists in removal of hydrogen sulfide from the raw coke oven gas, followed by removal of carbon dioxide by water scrubbing and treatment with caustic soda solution. The remaining gas mixture is cooled by heat exchangers and refrigeration until all gases except hydrogen and nitrogen are liquefied and removed. Nitrogen is produced separately in an air liquefaction plant to make the correct gas mixture. Gases

remaining after removal of hydrogen and nitrogen may be used for fuel as they have a high calorific value and are free from sulfur.

This process has been described by Napier (*Trans. Inst. Chem. Eng., Vol. 23, p. 220, 1945, London*). Taking the average known requirements for coke, steam, gas and power, he compares several synthetic processes on the basis of thermal requirements (Table I) which have been converted into consumption of coal per ton of nitrogen. For production of coke and gas, an overall carbonization efficiency is taken as 85%. For production of power where little or no steam is required, the efficiency from coal is taken as 20%, and for power and steam together, efficiency based on coal is taken as 27%. In all cases, the boiler efficiency is taken as 80%. For large quantities of power required for the electrolytic process, an efficiency based on coal has been taken as 28%.

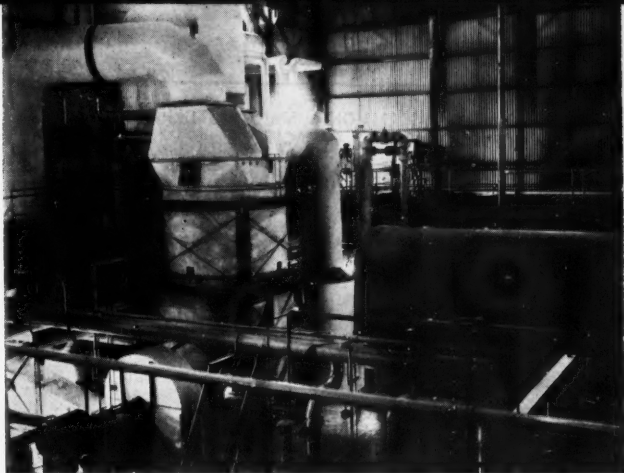
The comparison is not meant to indicate the relative costs of production by each process as they have different capitalization, labor and other costs. The value of coke and gas are not necessarily the same per therm, and in the electrolytic process the value of the oxygen has to be considered. Napier gives no data for the natural gas method as this is not used in Britain.

The steam-iron process which produces high purity hydrogen is described but no installations are known that use this process in ammonia production.

TABLE I. THERMAL REQUIREMENTS FOR NITROGEN FIXATION

Method	Therms* per Ton Nitrogen			
	Electrolytic	Semi-water Gas	Coke Oven Gas	Steam-Iron
Coke	....	530	....	740
Steam	....	250	8	202
Gas	....	331	....	....
Power	1525	303	480	273
Total	1525	1083	819	1215
Equivalent coal (tons)	5.8	3.62	2.72	4.02

* One therm = 100,000 B.t.u.



3. A secondary reforming uses air to convert CO_2 and H_2 to CO , H_2 and N_2 . 4. Scrubbing removes CO_2 , and the synthesis gas is compressed.

Electrolysis of Water. Water is electrolyzed by direct current, and since distilled water in caustic soda solution is used, the hydrogen and oxygen which is produced have a purity of 99.5% plus. Nitrogen necessary for the synthesis gas can be obtained from an air liquefaction plant. This method supplies a portion of the hydrogen requirements of Consolidated Smelting and Refining Co. at Trail, B. C.

The power requirement is very high, being reported as 10,000 kw-hr. per ton ammonia produced, which at 2 mills to 3 mills would make the cost \$20 to \$30 a ton ammonia. If the oxygen, produced at the same time as the hydrogen, can be utilized, however, the hydrogen cost will be reduced by the considerable credits that can be taken for the co-product.

CAPITAL OUTLAY

The capital required for a synthetic ammonia unit depends on the process to be employed, type of building construction required, whether power is purchased or generated on the site and many other considerations. As can be seen from Table 2, a coke plant must be adjacent to coal fields or else the cost of freighting coal to the plant is prohibitive. This is not so true of a natural gas plant, as the cost of fuel and raw material for the synthesis gas is a much smaller percentage of the total.

Estimates vary quite widely on the capital required to erect an ammonia plant, ranging, for the case of a natural gas synthetic ammonia plant from \$6.25 million to slightly over \$9.5 million for 150 tons of synthetic ammonia per day. Each estimate includes the necessary power, water and steam supply; land; and cost of construction. The consensus seems to be that \$8 million will cover the required expenditure for the average case. The estimated cost for a natural gas plant in Table 2 is based on this figure.

A new plant, using hydrogen from coke will cost from \$0.75 million to \$1.5 million more than a new plant based on

natural gas. Nine million dollars is the value used in Table 2, which gives a breakdown of the cost. For both cases, working capital requirements have been estimated to be about 15% of annual sales.

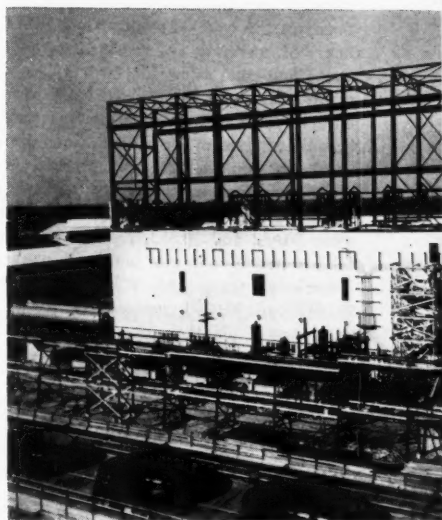
Usually 200 acres of fairly level land are considered adequate, although a 150-ton-a-day plant could be constructed on 25 acres. However, this would not leave room for expansion and possible subsequent installation of facilities to convert ammonia into commercial fertilizer material.

Necessary expenditures for the leasehold comprise: permanent roads, yard paving, railroad trackage, fencing, site clearance, grading, waste water disposal and drainage. Other items consist of fire protection, telephone system, power intake and distribution. Land and improvements would be common to both a coke-ammonia and a natural gas ammonia plant. Other processes that are common to both types of plant are gas purification, ammonia conversion, storage, loading, cooling water, and gas compression.

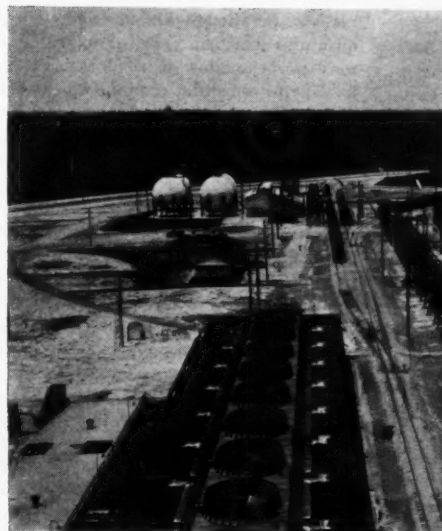
The greatest difference in cost between the two types of plants is in the steam supply, power and raw gas preparation. At southern locations, adjacent to gas gathering lines, fuel cost of a natural gas ammonia unit is lower than for coke-ammonia plants, and the simplicity of operation lowers the machinery and equipment cost by approximately one million dollars for a 150-ton-a-day ammonia plant. Steam plants are built in the south with only a shed covering for the boilers and a small building to house instruments and controls. In addition, fuel handling, ash removal, large gas holders, gas generating equipment and Cottrell precipitators for gas cleaning are not required. In the matter of gas holders, for example, one with sufficient capacity for only eight minutes ammonia production is all that is needed because hydrogen is produced from natural gas by a continuous process.

OPERATING COSTS

Production cost for ammonia produced



5. Synthesis usually takes place at 4500 psi.



6. Liquid ammonia storage in Horton spheres.

in wartime coke-ammonia plants was \$4.50 to \$8.00 per ton higher than in natural gas-ammonia plants, due to higher cost of coke and this spread today is greater because natural gas costs have risen only slightly while coke advanced to as high as \$16 to \$18 a ton for a short time. Also its poorer quality sent requirements to 1.7 to 1.8 tons of coke per ton of ammonia produced. The cost of producing ammonia without any return on the investment at today's coke costs is estimated at \$57 to \$58 a ton.

It is difficult to compare plants with respect to operating costs as they may be designed to use different kinds of power equipment. Compressors may be operated by electricity, gas or steam and the latter may be produced from coal or gas. Cost of utilities in wartime plants averaged about \$1.80 higher per ton ammonia produced in the coke-ammonia plants. Man hours of operating and repair labor average about the same for both types of plants. Steam is usually produced more cheaply in a natural gas-ammonia plant because of a steam credit from waste heat resulting from natural gas cracking in the preparation of hydrogen. Average steam costs per ton for wartime plants were \$0.652 and \$0.313, respectively, for coke-ammonia and gas ammonia plants. Electricity costs per KWH average \$0.0057 and \$0.0040, respectively, for the two types of plants.

END USE PATTERN

End use distribution of ammonia is difficult to determine because of the great variety of its applications as such, and of other chemicals derived from it. For example, nitric acid derived from synthetic ammonia has hundreds of small users who in the aggregate consume considerable tonnage of this acid and hence indirectly the ammonia from which it is made. In the allocation of synthetic ammonia under War Production Board regulations, no attempt was made to control quantities less than tank car lots of 26.5 tons except to allow distributors a certain tonnage for small-lot disposal which they did not have to account for.

However, preceding allocation, all producers were requested in January, 1942, to fill out WPB Form 566, giving distribution of shipments (exclusive of military explosives); the total 1941 calendar year production and forecast of 1942 production; and distribution of synthetic ammonia, including aqua ammonia. These data were compiled in the accompanying table and the estimates are as accurate as any that have been made. Even so, production of ammonia in 1941, was approximately 76,000 tons greater than the reported distribution and assuming a loss of 7% for conversion of ammonia to other end products, there would still be about 8% for which no accounting has been made. For this reason, it appears that many current estimates of ammonia use are too low.

TABLE 2. ESTIMATED 1949 AMMONIA MANUFACTURING COSTS AT 80% OF CAPACITY

(Per Ton of Liquid Ammonia)

	Natural Gas	Coke
Investment per ton-day of capacity.....	\$52,000.00	\$60,000.00
Working capital per ton-day of capacity—15% of gross sales.....	1,200.00	1,200.00
1.4 tons coke @ \$10 del. for water gas.....		14.00
1.25 tons coal @ \$6 del. for power and heat.....		7.50
		21.50
22,000 cu. ft. of natural gas @ \$0.10/1,000 cu. ft. for synthesis.....	2.20	
78,000 cu. ft. of natural gas @ \$0.10/1,000 cu. ft. for power and heat....	7.80	
	10.00	
Cost of chemicals — NaOH, etc.....	0.20	0.20
Cost of catalyst.....	0.80	0.20
Operating labor @ \$1.50 hr.....	3.00	2.50 hr. 3.75
Salaries and miscellaneous expense.....	1.00*	1.00*
Maintenance @ \$4 of investment.....	7.12	8.23
Operating Cost.....	22.12	34.88
ADD		
Insurance and taxes @ 1% of investment.....	1.78	2.06
Depreciation @ 6.5% of investment.....	11.57	13.38
Manufacturing Cost.....	45.47	50.32
ADD		
Sales cost @ 8% of sales price.....	6.00	6.00
Research @ 1% of sales price.....	0.75	0.75
Administration and miscellaneous @ 2% of sales price.....	1.50	1.50
Total cost of sales.....	53.72	58.57
8% return on total capital invested after income taxes of 38%.....	23.52	27.05
	77.24	85.62

* Estimated.

Current estimates of 1949 distribution are based on probable increases in consumption (Table 3).

The 1949 estimates for fertilizer chemical production were obtained from representatives of the Departments of Commerce and Agriculture and from private sources. For products, such as ammonium phosphate, Uramon and Cal-Nitro that are manufactured by one producer only, it is not permissible to give detailed data. However, the combined production of three commodities can be given.

The greatest increase in production has been since 1944-1945 fiscal year (July 1, 1944-June 30, 1945) as shown by Table 4.

Ammonium phosphate production by Southern Acid & Sulfur Co. (now Mathieson Chemical Corp.) at Houston, Texas, formerly Plancor 2100, had not gotten under way by 1945, and hence no production has been included for that year. Production of sodium nitrate has decreased slightly since 1945, due to shortage of soda ash used in its manufacture.

It should be noted that the Army plans to channel 22,000 tons of nitrogen equivalent to approximately 27,000 tons NH₃ into agricultural uses during 1949. New installations by Lion Oil Co., Phillips Chemical Co., and others should be in substantial production during part of 1949.

In addition to 578,000 tons synthetic nitrogen estimated for agricultural use in 1949, by-product nitrogen amounting to 180,000 tons is expected, making the total agricultural use 758,000 tons of nitrogen from U. S. sources. Imports from Chile, Canada and Norway, amounting to 198,000 short tons of nitrogen are also expected, thus making the total estimated used for agriculture, 956,000 tons from all sources.

Photo credits: No. 3, Lion Oil Co.; all others, Chemical Construction Corp.

TABLE 3. SYNTHETIC AMMONIA END—USE PATTERN

(Short Tons)

	1941 NH ₃	1949 NH ₃
Industrial Use		
1 Industrial explosives	73,740	120,000
2 Soda ash	300	3,000
3 Sulfuric and nitric acids	33,680	58,000
4 Petroleum refining	6,630	13,000
5 Refrigeration	13,560	18,000
6 Fermentation (yeast, etc.)	1,970	3,000
7 Metallurgy (nitriding, etc.)	9,410	18,000
8 Textiles (rayon-nylon, etc.)	10,670	31,000
9 Rubber (accelerators)	2,000	5,000
10 Plastics—resins—finishes	24,400	90,000
11 Dyes and intermediates	11,520	20,000
12 Pigments and dry colors	810	3,000
13 Ammonium salts	14,800	20,000
14 Nitrates and nitrites	8,250	25,000
15 Amines—amides—cyanides	7,340	35,000
16 Water treatment	...	20,000
17 Other industrial uses	28,300	18,000
Sub-Total	247,380	500,000
Less conversion losses (7%)		35,000
Total industrial	247,380	465,000
Fertilizer Use		
Fertilizer solutions and ammoniation	92,640	316,000
2 Sodium nitrate	79,100	42,500
3 Ammonium nitrate	...	158,000
4 Ammonium sulfate	14,760	69,300*
5 Direct application	7,420	54,700
6 Ammonium phosphate		62,000
Uramon		
Cal-nitro		
Sub-Total	194,320	702,500
Grand Total (Ind. and fert.)	441,700	1,167,500
Production	518,192	

* 35,000 tons Commercial Production.
22,000 tons Army Production to Agriculture.

TABLE 4. U.S. PRODUCTION OF SYNTHETIC AMMONIA

(M Short Tons)

Year	Private Plants	Gov't. Plants	Total
1939	321	...	321
1940	358	...	358
1941	518	3	521
1942	533	184	717
1943	507	591	1,098
1944	476	767	1,243
1945	461	647	1,108
1946	659	305	964
1947	1,046	385	1,431
1948	1,006	372	1,378



... USE Emery Oleic Acids ... a NEW High in Quality at Less than Pre-War Prices!

Lowest Unsaponifiable Content (All Grades)

Current production of all Emery oleic acids are higher in saponifiable content (lower unsaponifiable) than ever before, more reactive material per pound or per dollar.

Highest Color Stability

The unique stability of all Emersol Elaines is reflected in a similar stability in most products made from them. This will be noted in less darkening of original color under conditions of reacting or compounding, less tendency for finished product to oxidize or become rancid.

High Oxidation Resistance (Mackey Test)

All Emery Oleic Acids resist oxidation as indicated by their performance in the Mackey test. While Emersol 233 LL Elaine excels, regular grades are substantially better than competitive products.

Highest Oleic Content (No Rosin Acids)

Emersol 233 LL Elaine, the latest addition to Emery's oleic acids has been manufactured for those uses requiring minimum amounts of polyunsaturated fatty acids. Emersol 233 contains in excess of 90% mono-unsaturated fatty acids.

High Quality, Uniformity, Low Cost (Emersol Elaines)

	Titre	Color Lovibond	Unsaponifiable
Emersol 210 Elaine.....	8-11°C	30/8.0-1"	2.5%* max.
Emersol 211 Elaine.....	3-5°C	30/8.0-1"	2.5%* max.
Emersol 220 Elaine.....	8-11°C	15/1.5-5¼"	1.5%* max.
Emersol 221 Elaine.....	3-5°C	15/1.5-5¼"	1.5%* max.
Emersol 233 LL Elaine.....	6-9°C	5.0/0.5-5¼"	1.5% max.

*Former Unsap specifications for 210, 211—3.0%; for 220, 221—2.0% (233 is a new product)

At the new low prices oleic acid becomes an indispensable raw material. Products made from or containing oleic acid which have always been superior in performance, are now replacing the less efficient and consequently, more expensive substitute.

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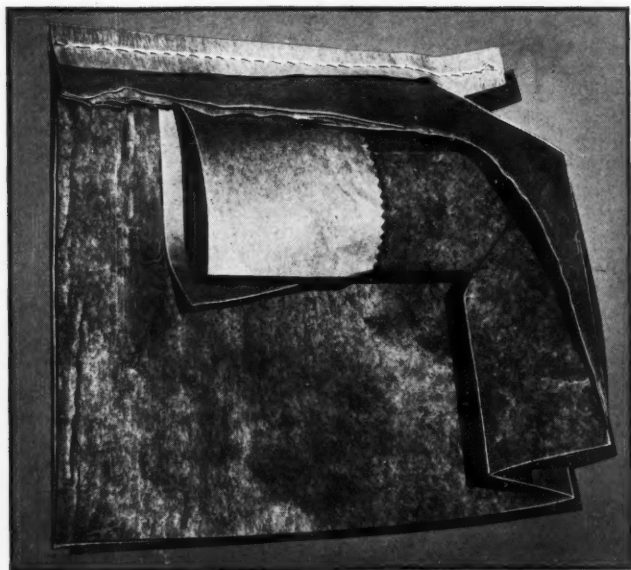
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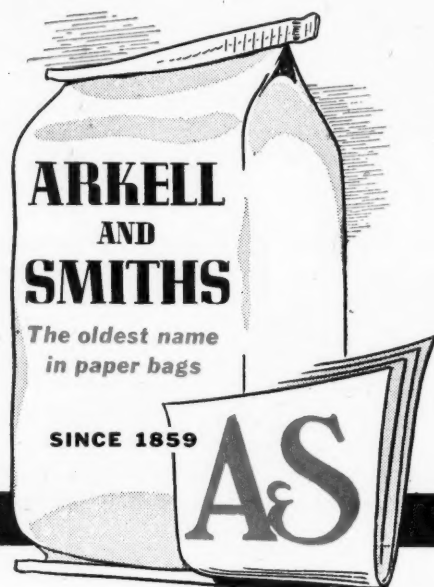


1 Less dusting when packing.

2 Less sifting when packed.

STUDY THIS cutaway illustration of the SHUR-CLOSE Valve Bag. The overlapping action at the top of the bag channels the material into the bag to give less dusting while filling. The two-way action of the valve comes when bottom section of valve crosses over giving quick, complete seal after bag is filled.

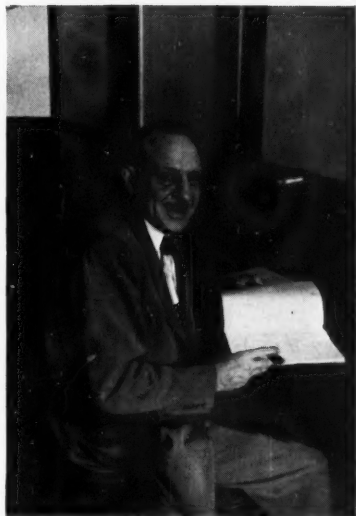
Plant demonstration runs have convinced scores of fertilizer and chemical manufacturers of these two advantages of SHUR-CLOSE Valve Bags over ordinary valve bags. Call or write our nearest office for a demonstration of the SHUR-CLOSE Valve Bag in your plant using your filling machines.



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THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES



LINCOLN T. WORK, formerly with Metal & Thermit Corp., has joined A. T. Lukens at Powdered Material Research Laboratories.



ROTHE WEIGEL, elected president, Victor Chemical Works. He has been with the company 25 years, executive vice-president for 2.

PEOPLE



RAYMOND L. COPSON, named director of research, Mutual Chemical Co. of America. He was formerly with Heyden Chemical Corp.



ROBERT M. SEMPLE, director of Monsanto Chemical Co.'s general development department, elected president of Wyandotte Chemicals Corp., effective Sept. 1, succeeding E. M. Ford, elected board chairman.



JOHN C. WARNER, named president-elect of Carnegie Institute of Technology to succeed Robert E. Doherty. He will hold the newly-created office of vice-president until his inauguration in July, 1950.

Facilities for Pump Testing

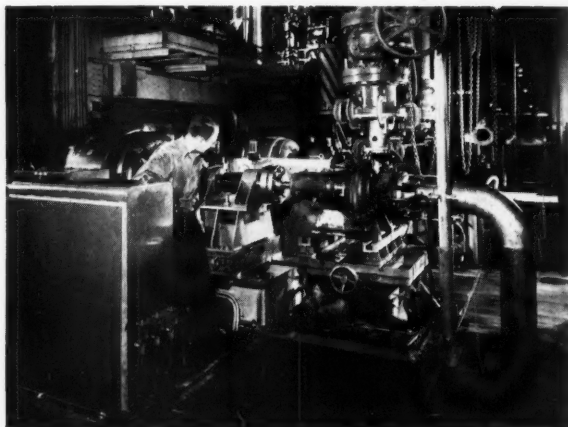
A new centrifugal pump test floor, designed to provide for both maximum testing accuracy and minimum testing time, has been put into service at the West Allis Works of the Allis-Chalmers Mfg. Co.

The facilities include a speed measuring device believed to be the most accurate mechanism ever built for continuously measuring and recording speed. It is used in conjunction with a Baldwin electric strain-type torque meter to obtain horsepower input into a pump.

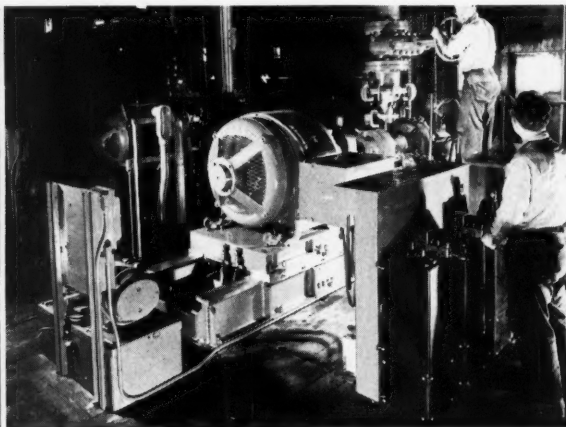
New equipment for measuring quantity of water pumped uses weigh tanks rather than wiers. This method permits more accurate readings and makes possible taking of test points automatically by means of a photoelectric cell.



Test stands are arranged in parallel. Each station has a test stand for mounting the pump, small discharge pipe overhead, connection to control room and a hydraulic pump and motor.



Paper stock pump. After pump and motor are lined up, hydraulic control is operated to slide the motor forward so couplings will join.

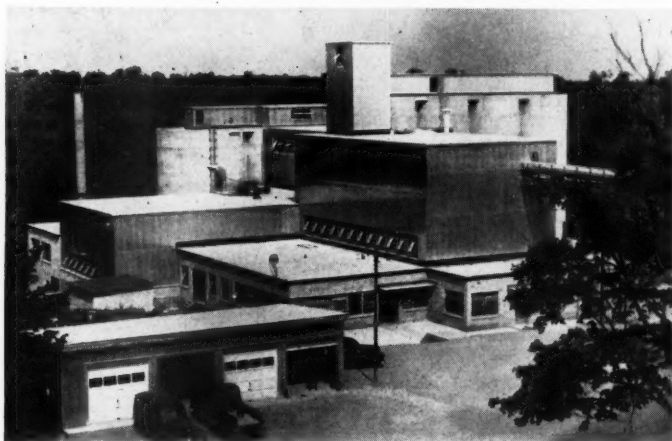


One operator is selecting motor speed by motor controls in foreground; the other is setting discharge pipe valve for discharge pressure.

Air-Milled Talc

The R. T. Vanderbilt Co.'s Nylal 300, a sterile talc of unusually fine particle size, is being produced by a unique process in a new million-dollar plant of the Gouverneur Talc Co. at Balmat, in St. Lawrence County, N. Y.

In the new process, the ore is first dried and then is air-milled at high temperatures and pressures. The action of the talc particles against themselves breaks particle size down to a fineness unobtainable by conventional methods. Nylal 300 has a specification of only a trace retained on a 325-mesh screen, and its average particle size is about 1.8 microns by air permeation.



Talc ore at R. T. Vanderbilt's new plant is brought out of the mine shaft, left, and travels through an overhead conveyor to the processing and storage plant, right.

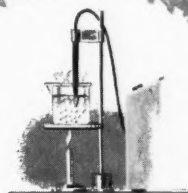


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So strong that the pH-sensitive bulb can withstand as much pressure as the thick stem itself!

Abrasion resistant—unusually rugged for long life and reliable measurement even in highly abrasive slurries!

Chemical durability—excellent in the strongest acids and alkalis... even at elevated temperatures!

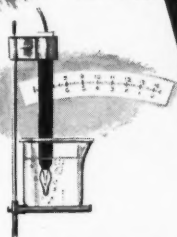


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30° to 130° C at high pH—with the new high temperature—high pH glass.

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NOW-NEW BECKMAN pH Electrodes



UNPRECEDENTED pH RANGE!

0 to 14 pH—with the high-temperature high-pH glass... only small reproducible deviation near extreme limits, even at high temperatures.

0 to 11 pH—at room temperature and 0 to 10 pH at boiling for the general-purpose glass... without correction for sodium ions!



IMPROVED CONSTRUCTION!

Simplified, heat-resistant construction eliminates wax filling... retains patented Beckman internal shielding... increases measurement precision.

Only Beckman Glass Electrodes offer all of these features:

► **RAPID RESPONSE**... accuracy with speed and convenience.

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► **INTERNAL SHIELDING**... gives complete freedom from outside electrostatic interference.

► **INTEGRAL LEADS**... Continuous insulation into the electrode... connections located on protected panel board.

► **EXTREME TEMPERATURE RANGE**... Several types permit use from below

freezing to boiling and above!

► **ENTIRE pH SCALE**... Very small sodium ion errors... e.g., with high-temperature high-pH glass, only 0.2 pH deviation at 13.7 pH in 1 N sodium hydroxide.

► **FACTORY SEALED**... rigidly tested... no maintenance.

► **UNIQUE CHEMICAL DURABILITY**... in alkali... in acid... in dilute solutions.

And... **REALLY TOUGH**... can even be used as a stirring rod!

Constant Research over the years has maintained Beckman Leadership in the instrumentation field...

—Beckman pH Meters and Glass Electrodes
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—Beckman Radioactivity Meters and Special Instruments... Unsurpassed for Reliability!

These new electrode glasses are now being used in several Beckman electrode styles. As rapidly as possible, they will be available in the full line of Beckman Glass Electrodes.

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Left to right, Robert L. Taylor, editor, Chemical Industries, and T. Pat Callahan, Monsanto Chemical Co.; Howard Huston and A. J. Campbell, American Cyanamid Co.; William Sterling, Corn Products Refining Co. bowling on the green; and W. B. Plummer, Indoil Chemical Co.

MCA at Skytop

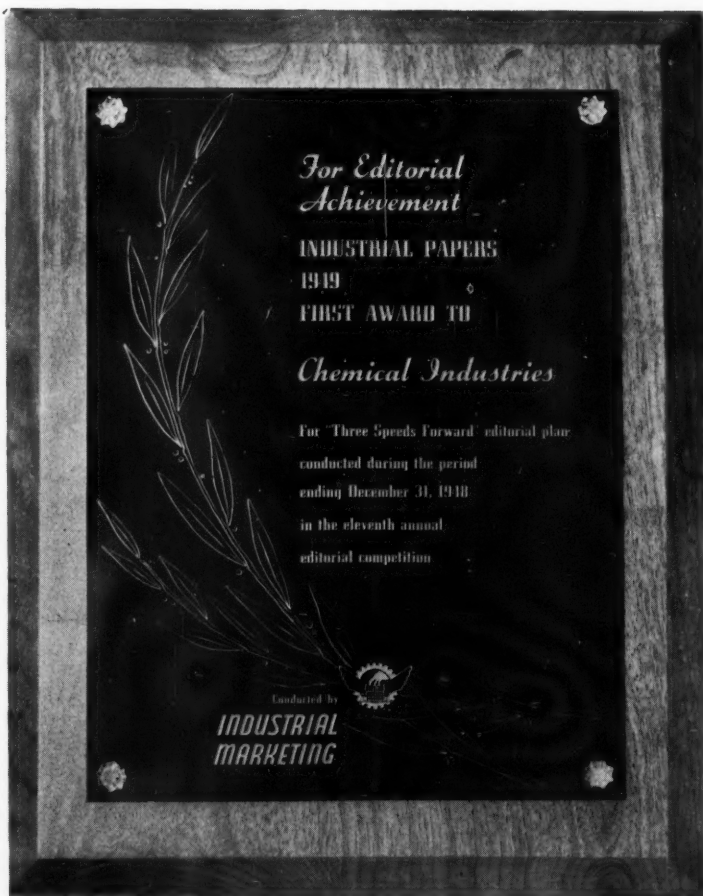
The 77th annual meeting of the Manufacturing Chemists Association was held on June 2 at Skytop, Pa. At the business meeting William M. Rand, Monsanto Chemical Co., was elected chairman; C. S. Munson, U. S. Industrial Chemicals, Inc., vice-chairman; and George Merck, Merck & Co., president.



Photographs by D. B. Keyes
J. P. Remensnyder, Heyden Chemical Corp.; R. N. Lulek, Heyden and C. L. Gabriel, Publicker Industries, Inc.; James Flanagan (standing), S. B. Penick & Co. and John L. Smith, Pfizer.

Chemical Industries Wins Editorial Award

A first award for editorial achievement in the annual business paper competition sponsored by *Industrial Marketing* magazine was presented to CHEMICAL INDUSTRIES last month at the annual meeting of the National Industrial Advertisers Association in Buffalo. The award, which consists of the bronze plaque pictured at right, was for CI's integrated editorial plan which has been in effect for approximately two years. Robert L. Taylor, editor, accepted the award on behalf of CHEMICAL INDUSTRIES.





3 groups of money-saving dark resins

adequate in range and use

	DESCRIPTION	USES
PARADENE #1, 2, 3, 33, 34 and 35	Melting point from 20° to 130° C. Readily soluble in petroleum and coal-tar (aromatic) solvents.	Used in manufacture of adhesives, concrete curing compounds, electrical insulation, floor tile, linoleum, paints and varnishes, pipe coatings, textile coatings and in compounding of natural and synthetic rubber.
465 RESIN	Melting point—105° to 120° C. Soluble in aromatic solvents and partially in petroleum solvents.	Used in the manufacture of adhesives, box toes, ethyl cellulose lacquers, impregnations, linoleum, floor tile, sealing compounds, varnishes and in the compounding of natural and synthetic rubber.
NUBA #1, 2, 3X	Melting point from 80° to 135° C. Soluble in aromatic solvents. They are cohesive and have high molten viscosity.	Used in the manufacture of adhesives, binders, box toes, briquettes, composition insulating blocks; filling, stiffening, molding and thermal insulating compounds; leather dressings, steep-roof coatings and for compounding natural and synthetic rubber.

Write for

samples and booklet
describing these resins.

A-32

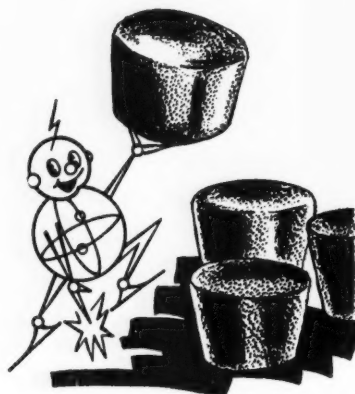
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Lithium metal—in the convenient form of 4 oz. cups—is Metalloy's most recent contribution to the industry. Shaped exactly like a muffin, the new cup is easier to handle than the lump or ingot form. It is available at no extra cost.

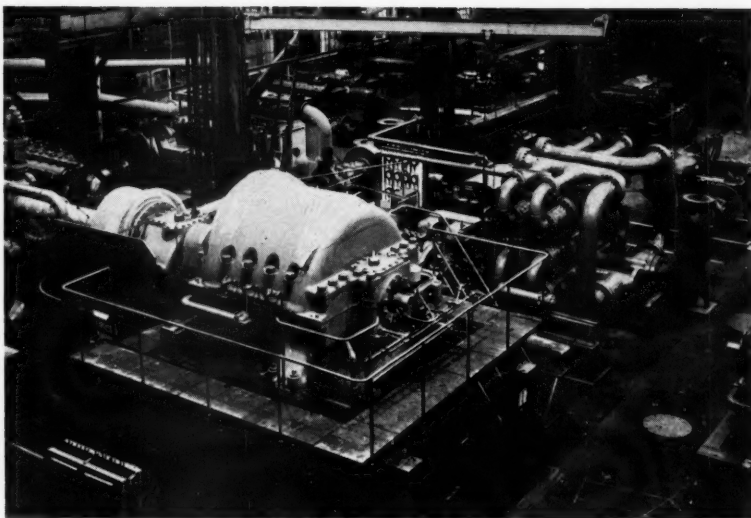
Metalloy has always endeavored to be more than just a supplier of Lithium. By constant research and close contact with industry, Metalloy has continued to develop new physical forms of Lithium and its compounds. For example, we pioneered Lithium metal in the form of wire, sand and shot. The new cup form was developed at the request of volume users in the synthetic organic chemical field who require a more convenient form than has been available.

As a further contribution to organic research, our technical staff has prepared an Annotated Bibliography on the use of Organolithium Compounds in Organic Synthesis which is available to research workers.

In addition, data sheets are available on Lithium metal in the form of lump, wire, rod, shot and cups.

METALLOY CORPORATION
Rand Tower Minneapolis, Minn.
DIVISION LITHIUM CORPORATION
OF AMERICA, INC.

Centrifugal Compressor



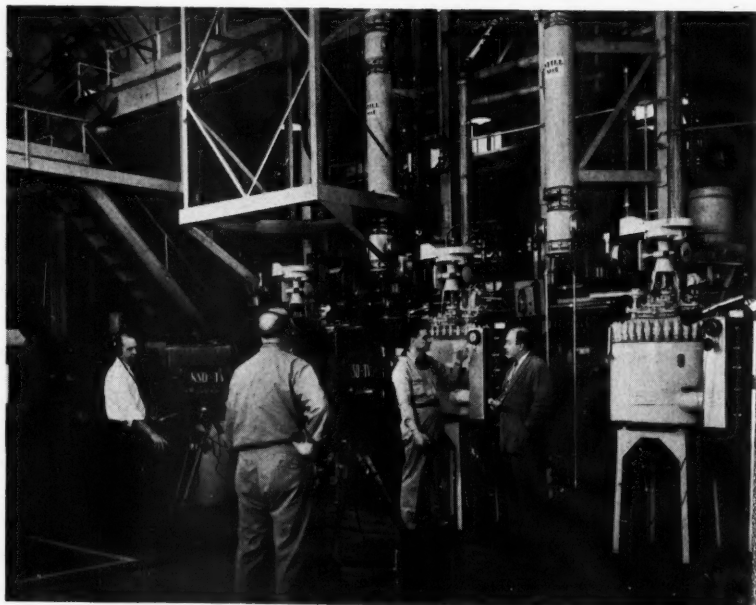
The largest single installation of centrifugal compressors in the world, to be set up at the Carthage-Hydrocol synthetic gasoline plant at Brownsville, Texas is shown above on test at the Clark Brothers Olean, N. Y., plant.

The compressor consists of a number of "wheels" or impellers mounted on a shaft which is rotated at high speed by a steam

turbine. The gas is introduced into the "eye" of the impeller near the shaft from which it is centrifugally thrown at high speed toward the casing.

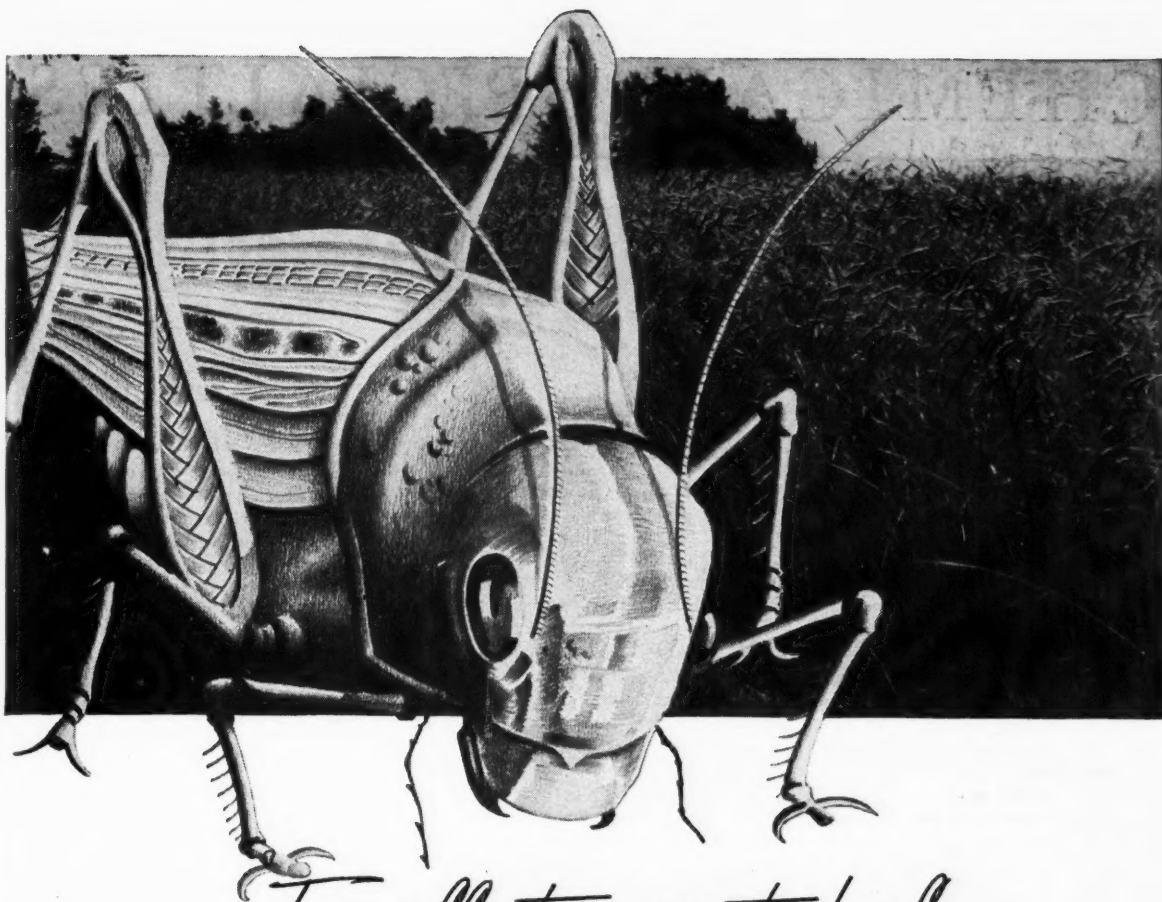
Compression of the gas occurs not by physically decreasing the volume, as with a piston, but by accelerating the gas to a high velocity and then slowing it down, changing velocity into pressure.

Television in Industry



Monsanto Chemical Co. recently presented an industrial on-the-spot television program in St. Louis, over the facilities of station KSD-TV. Bulk of the program was televised from the new research pilot plant of the John F. Queeny plant. It

included demonstrations of the company's chemicals and plastics. The program was seen on special receiving equipment by members of the American Wood Preservers Association at the Hotel Jefferson as well as on television sets in the area.



For effective control of
grasshoppers, boll weevil and certain other insects

Two Pittsburgh formulations of Toxaphene have proved to be chemicals of unsurpassed usefulness in controlling grasshopper plague, boll weevil attack, and the damage of many chewing and sucking insects. Both products have been exhaustively field tested under plague conditions, from Canada to South America. They are killers of extraordinary merit.

Pittsburgh Toxaphene - 40

A 40% Toxaphene Concentrate impregnated upon a dust carrier—designed for use by manufacturers, processors or compounders equipped to blend and dilute it to a finished dust. Especially effective as a cotton insect poison. Full technical information about *Pittsburgh Toxaphene-40* and the insects controlled by it, may be had by writing for Bulletin 107.

Pittsburgh Chlorophene - 60

A standardized liquid emulsifiable concentrate containing 60% by weight (6 lbs. per gallon) Toxaphene, specifically designed for use where a water spray application is adaptable and practical. *Pittsburgh Chlorophene-60* spray concentrate possesses the advantages of marked residual action and is effective on a wide range of insects as described in Bulletin 107.

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CHEMICAL SPECIALTIES

SHOE POLISH FORMULATIONS

by CORNELIA T. SNELL
Foster D. Snell, Inc., New York City

PROPER BLENDING of hard and soft waxes with suitable dyes and solvents is the key to making shoe polish, a specialty always in demand.

SHOE polish is an item always in demand, and one that is easily added to a specialty manufacturer's line. It is not as simple to manufacture as most other polishes, but proper application of basic principles will result in a good product. Since simple mixing vessels with provision for heating can suffice for equipment, production can be undertaken with little expenditure.

The wax-solvent type of shoe polish, although the oldest of the kinds now sold, is still the most widely sold. This perhaps is because shoe polish is used more by men than by women so that ordinary black or brown products are those in greatest demand. For women's colored shoes special colorless creams and pastes are made. Sometimes they carry a dye of the same color as that of the shoes to which they are to be applied. For example, blue paste shoe polish is now rather commonly available. Sometimes they are "neutral," that is, contain no dye for use on any color shoe.

GENERAL COMPOSITION

Shoe polishes are somewhat more difficult to make than some other polishes such as floor polish. A good shoe polish must be perfectly smooth and homogeneous, of the proper degree of hardness, yet easy to spread in a smooth, coherent, thin film. In order to achieve this result, a suitable mixture of waxes is necessary. The manufacturer has to choose these, both in terms of their properties and corresponding performance, and in terms of price. One wax must be hard, the other soft. The hard wax gives the luster and polish desired but would not be adherent on leather without a soft wax to modify its more brittle character.

WAXES

Of the hard waxes, carnauba has always been found the most satisfactory in terms of polishing properties. Others which fall in the same class and are rather similar,

are ouricury and candelilla waxes. Of the soft waxes, paraffin—not actually a wax but a hydrocarbon with wax-like physical properties—is very useful in combination with a hard vegetable wax. Paraffin softens the latter, makes it more adherent, and reduces graininess or the tendency to crystallize. Beeswax is a very good soft vegetable wax for combining with carnauba but is expensive and is usually present in a rather minor proportion. According to the aim of the manufacturer and the price that he feels he can get for his product, the choice of waxes varies, based on raw material costs. Refined grades of wax should be used, as crude grades contain a good deal of solid dirt, not all of which is easy to separate from the molten material.¹

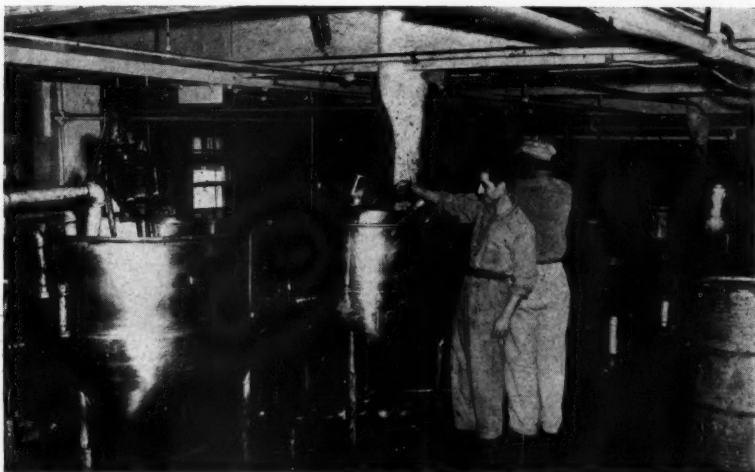
The ratio of hard to soft waxes varies in commercial products from 1:1 to 1:3. A high proportion of hard vegetable wax gives the better product but also increases the cost. The proportion of hard wax should not be too high however, or the product may shrink in the container.²

A small amount of wax-like hydrocarbon such as montan wax or ozokerite may be present but too large an amount is not satisfactory in terms of polishing properties. When vegetable waxes have been short in supply these have sometimes been supplemented by an excessive amount of mineral wax, as illustrated by the following German formulation:³

	%
Carnauba wax, gray	6
Montan wax, bleached	7
Ozokerite	2
Paraffin, m.p. 122-6° F.	11
Dye	2
Turpentine or solvent mixture	72

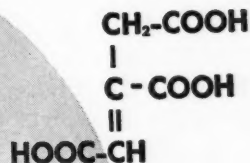
While there is some latitude in the choice of the kind and amount of wax to use, the high proportion of mineral wax in the above formula would give a rather poor product in terms of polishing properties. The table on page 70 gives the kinds of waxes frequently used, with melting points and price per pound in large bulk as of June 1949.

Other grades of some of these are also available at corresponding prices. Although ceresin has been described as refined ozokerite, actually this is not the case, as may be seen from the price. If it



Shoe polish manufacture requires relatively simple equipment.

NOW AVAILABLE . . .
in COMMERCIAL
QUANTITIES



Aconitic Acid

The only UNSATURATED
TRIBASIC ACID
On the Market

• Aconitic Acid, available until recently *only* in pilot plant quantities, is now available in commercial quantities and already is used in several important commercial applications.

POTENTIAL USES

Aconitic Acid offers many interesting possibilities in its unchanged form and as an intermediate for the preparation of other compounds. Specifically, Aconitic Acid is valuable in the preparation of sulfonated wetting agents. Makers of alkyd resins may find it useful in the preparation of these products. The esters of Aconitic Acid appear promising as plasticizers. Also useful for plasticizers because of their great stability are the esters of Tricarballic Acid, made by the hydrogenation of Aconitic Acid.

TYPES OF REACTIONS

Aconitic Acid undergoes the usual chemical reactions of an organic acid. For example, Aconitic Acid will form:

1. Salts and acid salts.
2. Esters.
3. An Anhydride.
4. An Acid chloride.
5. A Triamide.

Although not extremely reactive, the double bond of Aconitic Acid will undergo reaction such as sulfonation and halogenation (with a mercuric sulfate catalyst). Heating dilute solutions of Aconitic Acid at 100° C yields Itaconic Acid.

PHYSICAL CHARACTERISTICS

Molecular Weight	174.11
Appearance	White Crystalline Powder
Odor	None
Melting Point	195°C. with Decomposition
Solubility in Water @ 25°C.	26.4 Gm./100 ml.
Solubility in Water @ 90°C.	110.7 Gm./100 ml.
Solubility in Ether	Sparingly Soluble
Solubility in Acetone	Soluble
Solubility in Lower Alcohols	Soluble — Increased solubility when hot.

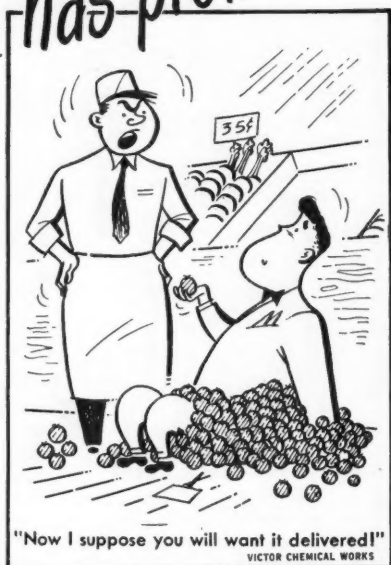
For prices and detailed information on this new unsaturated tribasic acid write Chas. Pfizer & Co., Inc., 630 Flushing Ave., Brooklyn 6, N. Y.; 425 North Michigan Ave., Chicago 11, Ill.; 605 Third Street, San Francisco 7, Calif.



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V2

CHEMICAL SPECIALTIES—

were refined ozokerite, the price should be higher than that for yellow ozokerite; actually, the price is lower than that of crude ozokerite. Ceresin is a mixture of refined ozokerite and paraffin, with the melting point furnishing the best lead as to how much paraffin is present. As indicated, the hard waxes have relatively high melting points, soft waxes relatively low. However, a choice cannot be made based on melting point alone. The actual polishing ingredient should be a hard vegetable wax, which is supplemented by some of the other waxes, with a limitation as to the proportion of these which can be used. When a hard mineral wax is present the proportion is preferably kept very low.

SOLVENTS

As a solvent, turpentine is very satisfactory because it gives a more colloidal dispersion of the wax mixture than would an organic solvent of the benzene type. The wax content of the product as made up is frequently in the neighborhood of 20-30 per cent. The solvent should have a high solvent power for waxes and should also evaporate rapidly so that when the polish is applied, the liquid will quickly disappear, leaving a water-resistant wax coating which can be readily buffed up to give the desired degree of luster.

Turpentine may be diluted and sometimes is even replaced by other solvents—for example, dipentene, benzene, kerosene, Stoddard's solvent, white spirit, and 1,4-dioxane. Sometimes combinations such as xylene and alcohol, or turpentine and acetone, are used. Other solvents have been sought because of the high cost of turpentine although with most of them, vegetable waxes show some tendency to crystallize.

COLORING AGENTS

From 1 to 3 per cent of an oil-soluble dye is present to dye and cover up scuff marks on shoes. The common black dye is nigrosine base, or this combined with stearic acid or oleic acid, the latter being preferable. Combining the dye base with the fatty acid increases its solubility in the waxes. Such a combination can be prepared by warming 2 pounds of olein and adding slowly with stirring 1 pound of nigrosine base.⁴ During preparation, the temperature should not go above 200° F. As much as 6-10 per cent of this can be used, based on the amount of wax.

Brown shoe polish is colored with Sudan dyestuffs, usually present in a final proportion of 1-2 per cent. These dyes do not require pre-mixing with a fatty acid as does the common black dye. For blue polishes, oil blue is used; for red, rhodamine base.

ODORANTS

At one time nitrobenzene (oil of mirbane) was much used as an odorant in shoe polish, but since this is poisonous its use is now banned in many places. Pine oil and sassafras are suitable odorants although blended products for the purpose, offered by several perfume supply houses, are convenient and satisfactory to use.

Occasionally manufacturers have introduced agents to give a softening and conditioning effect on the leather, such as lanolin or hydrogenated castor oil. Such a product should be present in only a very small amount because it will tend (1) to reduce the polishing property of the wax and (2) to make the polish less water-resistant.

EXAMPLES OF FORMULAS

The following formulas serve to illustrate preparation of paste-wax polishes.⁴

Black Shoe Polish

(1) Carnauba wax, gray	140	lbs.
Beeswax	100	lbs.
Ceresin	80	lbs.
Nigrosine oleate	25	lbs.
Turpentine	72	gal.
(2) Carnauba wax, gray	10	lbs.
Ouricury or shellac wax	10	lbs.
Beeswax	20	lbs.
Ceresin	40	lbs.
Lump oil black	8.5	lbs.
Turpentine	20	gal.

Brown Shoe Polish

Carnauba wax, gray	8.5	lbs.
Beeswax	10	lbs.
Paraffin	11	lbs.
Brown dye	3	oz.
Turpentine	6.75	gal.

The method of manufacture is to melt the hard waxes by themselves first, at the lowest possible temperature in order to avoid overheating the molten material and decomposing it. The dyestuff is then stirred into the melted wax until thoroughly dispersed. Soft waxes are then added and the temperature is allowed to fall. Solvents are added while the mass is still molten and warm, with thorough stirring to insure even distribution throughout the batch. The material is then run into containers. For best results, some form of rapid cooling is desirable immediately after the containers have been filled.⁵ Rapid chilling improves the texture and appearance of the polish and prevents solvent evaporation. This can be done by passing the filled containers through a refrigeration unit, or by the use of water-cooled trays.

SYNTHETIC WAXES

High-melting synthetic waxes came into use during a period when carnauba wax was not readily available. These are used in the same proportion and manner as the hard vegetable waxes. For example, the following patented polish incorporates a synthetic wax based on a

From SHELL CHEMICAL
in trial-lot quantities

ACROLEIN

$$\text{CH}_2=\text{CH}-\overset{\text{O}}{\underset{\parallel}{\text{C}}}\text{H}$$

PROPERTIES

Molecular Weight	56.06
Specific Gravity 20/4°C.	0.8389
Melting Point	-86.9°C.
Boiling Point	52.7°C.
Flash Point, Tag Open Cup	Below 0°F.
Colorless . Soluble in alcohol and ether	

REACTIONS OF THE CARBONYL GROUP

Reactant	Conditions of Reaction	Products of Reaction
KCN	Glacial acetic acid in ether solution	$\text{CH}_2=\text{CH}-\overset{\text{OH}}{\underset{\mid}{\text{C}}}-\text{CN}$ acrolein cyanohydrin
Malonic acid	Pyridine solution	$\text{CH}_2=\text{CH}-\text{CH}=\text{CH}-\text{COOH}$ 2,4-pentadienoic acid
Acetic anhydride	In presence of acid	$\text{CH}_2=\text{CH}-\overset{\text{O}-\text{C}-\text{CH}_3}{\underset{\mid}{\text{C}}}-\overset{\text{O}-\text{C}-\text{CH}_3}{\underset{\mid}{\text{C}}}$ acrolein diacetate
$\text{C}_2\text{H}_5\text{MgBr}$	Grignard solution	$\text{CH}_2=\text{CH}-\overset{\text{OH}}{\underset{\mid}{\text{C}}}-\text{C}_2\text{H}_5$ 1-penten-3-ol
HCl (dry)	Low temperature	$\text{Cl}-\text{CH}_2-\text{CH}_2-\text{CHO}$ β -chloropropionaldehyde

REACTIONS OF THE DOUBLE BOND

Furan	Presence of SO_2 and high temperature	2-furanpropionaldehyde and 2,5-furandiopropionaldehyde
Cyclopentadiene	Elevated temperatures	2,5-endomethylene-1,2,5,6-tetrahydrobenzaldehyde
RSH	—	$\text{R}-\text{S}-\text{CH}_2-\text{CH}_2-\text{CHO}$ β -alkylthiopropionaldehyde
Phenol	In presence of acid or dilute alkali	aldehyde type resins

A VERSATILE, EXTREMELY REACTIVE INTERMEDIATE

● Acrolein, a highly reactive unsaturated aldehyde, offers an almost unlimited variety of reaction possibilities.

Characterized by two functional conjugated groups, Acrolein has significant new-product potentialities. The olefinic bond and the carbonyl group may react independently, simultaneously, or successively.

Some of the products of the many possible Acrolein reactions are listed here. If you are working with any of these intermediates, we suggest that you investigate the feasibility and economics of the Acrolein route. We will be glad to discuss any possible use of Acrolein in your processes.

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CHEMICAL SPECIALTIES

compound made from ethylene and a saturated organic.⁶

	%
Synthetic wax, high-melting	10
Beeswax	10
Turpentine	80

A nigrosine dye is added to this, the mass is allowed to cool to 176° F. with stirring, poured into containers, and cooled.

Another patented product containing a synthetic wax combines this with a hard vegetable wax:⁷

	%
<i>o</i> -Steramidobiphenyl (Synthetic wax)	6
Candelilla wax	14
Beeswax	2
Paraffin	4
Turpentine	74

EMULSION PASTES

Emulsion pastes based on wax have been prepared and are fairly successful but are not as water-resistant as those made with solvent only. This is because in the former, the emulsifying agent ordinarily remains in the wax mixture. However, just as good a luster can be produced and it can be rubbed up as quickly. Synthetic waxes may be present or not. Examples are the following:

(1) Carnauba wax, gray	18	lbs.
Beeswax	12	lbs.
Paraffin	12	lbs.

WAXES COMMONLY USED IN SHOE POLISHES		
	Melting Point °F.	Price per Pound
<i>Hard vegetable waxes</i>		
Carnauba, No. 3, chalky		\$0.75
Carnauba, No. 3, refined	183-6°	.84
Ouricury, refined	180-2°	.77
Candelilla, crude		.39
Candelilla, refined	152-4°	.44
<i>Soft vegetable waxes</i>		
Beeswax, crude		.52
Beeswax, refined	145-8°	.57
<i>Hard wax-like hydrocarbons</i>		
Ozokerite, black	189-90°	.31
Ozokerite, yellow	189-90°	.25
Montan, crude	192-4°	.26
<i>Soft wax-like hydrocarbons</i>		
Paraffin, refined	132-4°	.075
Ceresin	132-6°	.16
Ceresin	158-62°	.22

Amino-methyl-propanol (emulsifier)	2.5	lbs.
Nigrosine	9	lbs.
Soft water	15	gals.
	%	

(2) Synthetic wax, m.p.	
167-70° F.	10
Candelilla wax	30
Synthetic wax, m.p.	
214-16° F.	40
Diethyleneglycol ester of stearic acid (emulsifier)	25
Turpentine	10
Soft water	500
Dye, water-soluble, to suit	

In the first emulsion formula,⁴ the waxes and stearic acid are melted together. As

soon as these are melted, the propanol emulsifier is stirred in. The dye is dissolved in the water, and this boiling solution is then added with stirring. In the second formula,⁸ the waxes are melted together and mixed. The emulsifier is dispersed in this melted mixture until homogeneous and the turpentine is stirred in until smooth. The dye is dissolved in hot water and filtered. The wax-solvent mixture is poured into the dye solution, stirred, then run into containers. With this type of product it is necessary to have an emulsifier which is efficient for dispersing waxes in water. Many such are available.


CONTAINERS

Containers have not changed much over the years. One finds paste-solvent polishes still packed in the same convenient flat tins, usually holding about 1½ ounces. Cream or emulsion pastes are frequently packed in collapsible tubes. Porcelain jars have also been used, one being conveniently designed with screw caps at both top and bottom. The bottom cap holds a small buffing pad. This is undoubtedly a patented design. It offers practically the same convenience as the old-fashioned dauber in colored shellac solution.

The presence of these familiar containers in "ten-cent stores" testifies to the constant popularity of this specialty in periods of both depression and prosperity. In the first case, people do their own shining; in the latter, they pay for "shines." A good product can win its share of this steady business.

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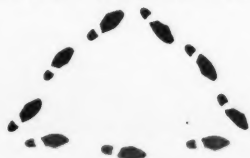
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AMBERLITE IRC-50 has no sulfonic or phenolic constituents to compete for cations—no strong acids whose avidity for cations causes them to seize the bad with the good. Extremely high capacity and high acid-regeneration efficiency combine to bring economy to your separation processes. And AMBERLITE IRC-50 *can be buffered* to a very wide range of salt-to-free acid ratios, so that adsorption can be performed at controlled pH values—a refinement difficult with strong-acid exchangers.

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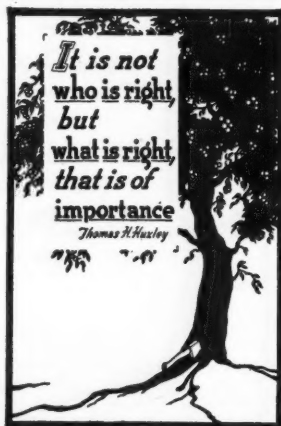
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CHEMICAL SPECIALTIES

Operation Locust

by G. ALLEN MAIL, Entomologist
Boyle-Midway, Inc., Jersey City, N. J.

CHLORDANE AND TOXAPHENE are the most effective insecticides in the fight against the worst grasshopper infestation in 9 years.

THE GREATEST war on grasshoppers since 1940 is now being waged over more than half of the United States, the struggle being especially fierce in Colorado, Wyoming and Montana. Farmers, however, have not been caught napping. Techniques developed by U. S. Department of Agriculture scientists indicated last fall that a bad "hopper" outbreak was imminent. And they have two relatively new chemical weapons—toxaphene and chlordane—to fight the pests.

A combination of factors is responsible for the severe infestation. This is the grasshopper phase of the cycle in which their natural enemies, or parasites, increase with the 'hoppers and practically annihilate them, then diminish for lack of hosts. The 'hoppers recover, followed by the parasites, and another cycle starts. Added to this are several years of long dry spells favoring egg deposition, and deep snows favoring egg survival.

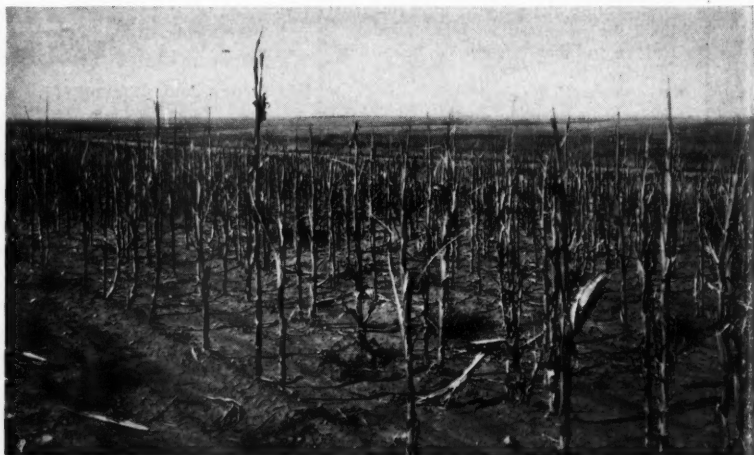
For the past three decades, the principal defense against grasshoppers has been poisoned baits. Formulae have undergone changes, both in attractants and toxicants. Blackstrap molasses, chopped whole oranges or lemons, amyl acetate, salt and apples all have been recommended at various times to attract grass-

hoppers to the bait. Toxicants used have included white arsenic, Paris green, arsenite of soda or sodium fluosilicate, which is now the standard. Carriers have included wheat bran, middlings, alfalfa meal, hardwood sawdust, and horse droppings or combinations of two of these.

The dampened bait was scattered thinly over the fields, either broadcasted by hand or with a bait spreading machine, at from 5 to 10 pounds of bait per acre. For bait dispersion, the airplane has not proved too satisfactory, although many hundreds of tons of bait have been spread by this medium.

NEW INSECTICIDES EFFECTIVE

During recent years extensive laboratory and field tests of some of the newer synthetic insecticides have shown chlordane and toxaphene to be superior in kill and more economical in the long run than the bait method of control, hitherto standard. Work in South Dakota by R. L. Shotwell of the USDA (Bull E-771, March, 1949) reveals the far greater effectiveness of these insecticidal sprays in reducing infestation, minimizing corn damage, and controlling egg deposition. Moreover, baits have no residual effect



Grasshoppers leave nothing but stalks after descending on corn field. U. S. Dept. of Agriculture

Antara Products
General Aniline &
Film Corp.

Antara Extra

An Antara Products Publication

Detergents
Emulsifiers
Wetting Agents
Dispersants
Carbonyl Iron Powder

444 MADISON AVENUE

NEW YORK 22, N. Y.

JULY, 1949

Unusual Organic "Compound #3" Used by The Seymour Manufacturing Company as Nickel Brightener

Another example of the versatility of the many organic compounds offered by Antara Products, General Aniline & Film Corp., is the revelation made by The Seymour Manufacturing Company of Seymour, Conn., that an Antara product has been used successfully as a nickel brightener.

Known to Antara Products as "Compound #3", the product has been used for years in a number of intermediate processes. When The Seymour Manufacturing Company consulted Antara Products, "Compound #3" was suggested to meet their requirements for the particular type of organic compound they desired as an answer to their "Bright Nickel Process" problem.

The bright nickel plating, as developed and patented by The Seymour Manufacturing Co., with "Compound #3", now is accomplished economically with results that never before were possible.

Among the advantages of the Seymour Bright Nickel Process are: the deposited nickel plate requires no further finishing before chrome plating; base metals having acceptable finish may be bright nickel plated directly.

The Seymour Manufacturing Company points out that "Compound #3" makes it possible to bright nickel plate directly on fine grained copper. Wherever it is used, it gives perfect adherence to the base metals when they are properly cleaned. The company also has been able to chromium plate objects which have been bright nickel plated without removal from the original racks.

The Bright Nickel Process of The Seymour Manufacturing Company is but one example of the many uses to which Antara Products' unusual organic compounds may be applied. If you have a product or a process or problem for which you have not yet found the right answer, write Antara Products at 444 Madison Avenue, New York 22. Antara Products did it for Seymour. Perhaps it can be done for you.

Sees Bright Future for Detergent-Sanitizers

The detergent-sanitizer field has a bright future, Lee D. Callans, Assistant Sales Manager, Antara Products, told members of the National Association of Insecticide & Disinfectant Manufacturers, June 14th at the Hotel Drake, Chicago.

Five New Foaming Anionics Added to Antara Products Line

Five new foaming anionic detergents known as the Antarons have been added to the family of surface active agents of Antara products, General Aniline & Film Corporation.

The Antarons listed are alkyl sulfonated synthetic surface active agents with excellent wetting, emulsifying and dispersing properties.

Antaron L-135 is a white powder, soluble in water and electrolyte solutions, stable to acids, alkalis, and temperature change. It has a density of 0.54. Among the uses of Antaron L-135 are: most general cleaning operations, the washing of fine fabrics, the washing of woolens, the washing of fruits and vegetables, and dairy cleaning.

Antaron L-177 is a more concentrated form of Antaron L-135 with the same stability and solubility. It has a density of 0.76. It has uses similar to Antaron L-135.

Antaron L-135 and Antaron L-177 may be used in combination with ordinary soaps to improve their detergent action and to disperse insoluble compounds generally formed with hard water salts. Both products can be blended readily into liquid soaps.

Antaron N-185 is a buff white powder with a slightly sweet odor. This product is soluble in water, hard water and moderately soluble in electrolyte solutions. It is also stable to metal ions, boiling water, and on storage, and is moderately stable in acid and alkaline solutions. It is used as a foamer and dispersant for metal salt precipitates. It replaces soap for such uses as: upholstery and rug cleaning, shoe cleaning and detergent dispersant in white shoe dressing, detergent base for laundering, dishwashing, wall cleaning, or auto washing composition, and commercial woolens and fine fabrics washing.

Antaron L-114 is a light yellow gel. This product is stable in acids, alkali, hard water, metal ions, boiling water and on storage. It is also soluble in water and hard water and is moderately soluble in electrolyte solutions and ethanol. Antaron L-114 is similar to L-135 in its applications.

Antaron R-275 is a grey white powder. It is stable in hard water, metal ions, boiling water and on storage. It is also soluble in water, hard water, and electrolyte solutions. Its density is 0.57. Antaron R-275 may be used in metal cleaning with Antaron A-180, a non-ionic, for non-alkaline metal degreasing. It may be used as a wetting agent where acid or alkali stability are required, and also when combined with Antaron L-135 it may be used in wettable DDT powders. It is a good anti-spotting agent in film developing and

is used in emulsion copolymerization of Buna S type synthetic rubber.

Further information on the Antaron family is available by writing Antara Products.

New Non-ionics Offered to Industry

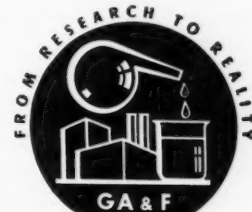
Two new non-ionic detergents of the aromatic poly-ethylene glycol ether type, Antaron "A-400" and "A-480", are displaying versatility at low cost in many applications.

The fact that these two new detergents are practically odorless, makes them particularly valuable for the specialized demands made upon detergents today.

Antaron "A-400" and "A-480", because of their ether structure, are extremely stable in the presence of acids, alkalis, and electrolytes. Because they do not ionize, they will not form insoluble compounds in hard water. They do not easily decompose or separate and will withstand wide variations in temperature.

In addition to all these characteristics, their physical and chemical properties will not change over long storage periods.

Why don't you try these versatile materials?



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since they lose their attractiveness when they dry out, especially in the presence of green vegetation. Those containing chlordane or toxaphene, however, have proved advantageous on dry sparse range grass, grain stubble or dry vegetation where there is no succulent green growth. Bran baits impregnated with these toxicants are not being spread by airplane over 1.5 million acres in Wyoming and Montana.

Government workers headed by J. R. Parker of Bozeman, Montana have made extensive tests with insecticides in alfalfa fields in Arizona, California, and Montana. When applied as sprays or dusts, chlordane and toxaphene caused high hopper mortalities within 24 hours and, of almost equal importance, sprayed or dusted areas continued to kill grasshoppers drifting into these areas for 1 to 4 weeks thereafter. A dosage of 1 pound of actual chlordane per acre reduced grasshopper populations 90 to 99 per cent in 3 days or less. Oil solutions or emulsions generally were found to be more effective.

With toxaphene, best results were obtained at 1½ pounds per acre and, as in the case of chlordane, solutions and emulsions were more effective than dusts. One pound of chlordane per acre was as effective as 1½ pounds of toxaphene, but where dusts were used, to obtain the same kill approximately 2 pounds of the toxicant were found to be necessary.

Of the other insecticides tested, all were inferior to chlordane and toxaphene in residual effect, showing toxicity for but 1 to 5 days as compared with 1 to 4 weeks for these two. Benzene hexachloride was erratic in performance and hexaethyl tetraphosphate failed to substantiate in the field the excellent results obtained in the laboratory although on occasion kills of 90 per cent or better were obtained with 1.35 pounds of HETP in 50 gals. of water or 5 gals. of oil per acre. It caused no foliage injury, and there was no residual toxicity. Parathion, either in dust at the rate of 0.4 pounds per acre or spray at 0.75 pounds per acre gave excellent kills with residual effectiveness for 5 days. (DDT, which is relatively ineffective in grasshopper control, has not been considered in recent experiments.)

FROM THE SKY

The million dollar "operation locust" now being carried out by airplanes over the Wyoming and Montana ranges will more than pay for itself in feed saved. Chlordane and toxaphene are the "block busters" that will wipe out the hoppers before they can wipe out valuable crops as they have in the past. Entomologists, of course, have cautioned ranchers not to feed treated forage to dairy cows or to stock being readied for slaughter, or to graze such animals on crops for some weeks after treatment.

SPECIALTIES NEWS

Babbitt Marketing Swerl

B. T. Babbitt, Inc., is now marketing Swerl, the alkyl aryl sulfonate manufactured by National Aniline Division of Allied Chemical & Dye Corp. Babbitt also handles the marketing of Glim, General Aniline & Film Corp.'s liquid detergent primarily sold for dishwashing. H. J. Heinz Co. had previously distributed Swerl.

Hyman Wins Appeal

In a decision reversing the Superior Court of Cook County, the First Division of the Appellate Court of Illinois recently ruled in favor of Julius Hyman in the suit for ownership of the patent applications on chlordane, well-known insect toxicant. This suit had been instituted by Velsicol Corp., of Chicago.

Title to the chlordane patent applications has been in litigation since 1946, when Dr. Hyman left his position as executive vice-president of Velsicol Corp. and subsequently organized Julius Hyman & Co. Since 1947 the Hyman Co. has manufactured chlordane under the brand name Octa-klor at its plant in Denver.

Polymer Industries Buys Willard Paste and Glue

Polymer Industries Inc., Astoria, has acquired the Willard Paste and Glue Co. The modern Willard plant in Brooklyn, N. Y., will be continued under the new ownership, as well as the Polymer Industries plant in Astoria.

Polymer Industries manufactures laminating adhesives, waxed bag adhesives, specialty bottle labeling adhesives, paper coating compounds and other formulated products. The Willard operations will supplement this line with tube winding, case and carton sealing, flexible glue, etc.

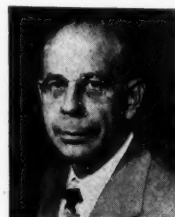
DDT Reported Fatal To Bird Life

Reports of birds dying following the use of heavy applications of DDT to elm trees in localized areas to control the insect carriers of Dutch elm disease and phloem necrosis have been received by the U. S. Department of Agriculture. These reports have come from Princeton, N. J.; Cleveland, Ohio, and Indianapolis and Muncie, Ind.

Department entomologists and Fish and Wildlife Service biologists are investigating the situation in several northeastern localities where experimental control operations are now in progress. No reports of bird losses have been received

from some of the control operations but in others it has been established that birds have died. The assumption is that the birds have died of DDT poisoning, and the purpose of the investigation is to learn the facts.

DDT is the only insecticide found effective so far in the experimental tests against insect carriers of these two tree diseases. Many new insecticides are now being tested to find an effective treatment which won't injure the birds.



James F. Thompson (left), elected vice-president, Sterling Drug, Inc., in charge of the Hilton-Davis Chemical Co. Division, and Norman F. Storm, elected executive vice-president of Ciba Pharmaceutical Products, Inc. Mr. Storm has been vice-president in charge of production at Ciba.

Army Contract Awards

Among the contracts awarded by the Department of the Army were the following, let by the Chicago Corps of Engineers Purchasing Office: Walter Kidde & Co., Inc., Belleville, N. J., 5000 fire extinguishers, \$133,750; Stop-Fire Inc., Brooklyn, 31,000 fire extinguishers, \$161,140. The Raritan Ordnance Arsenal, Metuchen, N. J., let the following contracts: U. S. Industrial Chem., Inc., New York City, 105,000 gal. of antifreeze, \$194,250; Mystik Adhesive Prods. Div., Chicago Show Printing Co., Chicago, 162,000 rolls of adhesive tape, \$606,375; Atlas Paint and Varnish Co., Irvington, N. J., 72,500 gal. of enamel, \$119,625; Bruning Bros., Inc., Baltimore, 60,000 gal. of enamel, \$106,350; Rockford Paint Mfg. Co., Rockford, Ill., 55,000 gal. of enamel, \$113,620.

Pittsburgh Plate Restores Paint Lines

A number of pre-war medium-priced paint lines and a line known as the Bulletin Colors are again being produced by Pittsburgh Plate Glass Co.

The former, which include the Pittsburgh utility house paint, flat wall paint and enamel lines, have been reintroduced to meet demand for serviceable coatings in the medium price field. The utility house

Cowles CHEMICALS

DRYMET*

The Economical Detergent Silicate

Cowles DRYMET, anhydrous sodium metasilicate, is the most highly concentrated form of sodium metasilicate available. It is more economical to use, on the basis of both Na_2O (alkalinity) and SiO_2 (silicate) than any other type of hydrated or anhydrous detergent silicate, either compounded or by itself. DRYMET contains no water of crystallization.

CRYSTAMET*

The Medium pH Detergent Silicate

Cowles CRYSTAMET is a pure, perfectly white, free-flowing granular pentahydrate sodium metasilicate with the normal 42% water of crystallization. Suggested for compounding when it is desirable to lower the concentration of a finished product. Readily soluble — chemically stable — easy to handle. Can be used on medium pH jobs.

DRYSEQ*

The All-Purpose Detergent Silicate

Cowles DRYSEQ, anhydrous sodium sesquisilicate, is a medium pH alkaline cleaner which will do fast, dependable work at a low cost to the user. It is a white, free-flowing powder, quickly and completely soluble in hot or cold water—containing 56.75% Na_2O —making it an economical base material for compounding.

DRYORTH*

The Heavy-Duty Detergent Silicate

Cowles DRYORTH, anhydrous sodium orthosilicate, is a powerful, speedy, heavy-duty cleaner with valuable penetrating and wetting-out properties, reinforced dirt-removing power and unusual emulsifying action. It is an anhydrous, free-flowing powdered silicate containing not less than 60% Na_2O , which may also be used as an economical constituent of high pH cleaning compounds.

We'll be glad to send you our DRYMET File Folder containing complete technical information and suggested formulations.

*Reg. U. S. Pat. Off.

PROMPT SHIPMENTS FROM CONVENIENT WAREHOUSE STOCKS

Cowles Chemical Company

HEAVY CHEMICAL DEPARTMENT

CLEVELAND 3, OHIO

CHEMICAL SPECIALTIES—

paint line will have the same fume-proof qualities as the new Sun-Proof first line paints.

Features of the Bulletin Color line, especially desired by sign painters, are their durability under trying weather conditions, their color permanence, their ability to set up quickly which minimizes dirt collection, their solid one-coat coverage, their non-bleeding qualities and their easy brushability.

Chlordane Widely Used For 'Hoppers in Canada

The severe grasshopper infestation in Canada is being combatted by use of chlordane both as a spray and in baits, the latter method being employed quite extensively. A recent survey of the provinces of Manitoba, Saskatchewan and Alberta, where the government is sponsoring the control program, showed that applications of one-half pound of chlordane per acre were giving virtually complete (over 99%) control.

Baits impregnated with chlordane are being used to a greater degree in Saskatchewan than in the other provinces. One minor objection to them is that they do not last long enough and the farmer must bait every 5-7 days, but they are still superior to old sodium arsenite and fluosilicate baits in this respect. Areas in which there were as many as 1000 dead grasshoppers per square foot testified to the efficiency of the program.

Tin Can Restrictions Eased

The Department of Commerce has relaxed controls over the use of tin cans by certain changes in Allocation Order N-81. Major changes permit use of .25 pound tinplate or special coated manufacturing terneplate for packaging any product, and the use of .50 pound tinplate in the production of (1) all hand-soldered cans; (2) drawn necks and nozzles, and (3) soldered parts of all 5-gallon square cans.

Among the items specifically listed as entitled to use tin cans are disinfectants and germicides, which can use a .50 pound tinplate; insecticides and fungicides, and soap (liquid, synthetic detergents), which can use 1.25 pound tinplate. Paste soap is limited to .50 pound tinplate.

Diesel Oil Carrier Aids 2, 4-D Effectiveness

Use of diesel oil instead of water as a carrier for 2,4-D has increased the effectiveness of the chemical spray, recent tests by Oklahoma Agricultural Experiment Station agricultural engineers show.

Addition of small quantities of ammonium sulfate (Ammate) to 2,4-D sprays for killing brush has given promising results.

Research planned involves design of

sprayers and dusters for brush control, as well as further work with various chemicals.



S. F. Thune (left), named sales manager, Mid-Western Division, National Starch Products Co., and Joseph L. Ciminera appointed to the new position of research biometrician, Sharp & Dohme, Inc.

Companies

Allied Asphalt & Mineral Corp., New York City, manufacturers of pitch compounds and waxes and distributors of Gilsonite, will be represented in Cleveland by Norman G. Schabel Co., Lakefront at East Ninth Street, Cleveland.

Reardon Industries, Inc., Cincinnati, maker of concrete colors and concrete chemicals and hardeners has opened an office and plant in Houston, Tex. Donald Dillon has been promoted from the main works at Cincinnati to assume the post of Texas manager.

Construction of a new addition to the Canal Street plant of The Connecticut Plastilight Corp., Stamford, Conn., is expected to be completed this month. The expansion is necessary to meet the increased demand for Plastilight plastic surfacing for table tops.

Carlo Erba, Inc., pharmaceutical chemists, and Gi. Vi. Emme Perfumes have moved their laboratories and general offices to 322 East 44th St., New York City. The new quarters are completely air-conditioned and are ideal for the manufacture of parenteral solutions.

Meredith, Simmons & Co., Ltd., has changed its name and will be known as National Adhesives (Canada), Ltd. It has been affiliated with National Starch Products, Inc., and its predecessor company since the original incorporation in 1920.

National Laboratories, Inc., Toledo, Ohio, has widely expanded its sales organization with the promotion of six members to key positions, to keep pace with a steadily increasing sales volume and doubled production capacity of the new plant in that city.

The John H. Calo Co., Inc., New York City, has been appointed the exclusive agent, in the New York metro-

politan area for the sale and distribution of Reynolds Metals Co.'s aluminum pastes and powders, which are widely used in the paint, plastics, paper coatings, rubber, pyrotechnics and ink industries.

Personnel

• **Ernest H. Volwiler,** executive vice president of **Abbott Laboratories,** has been awarded an honorary degree of doctor of science by Northwestern University.

• **Klem Chemicals, Inc.,** has appointed J. M. O'Brien as assistant sales manager. He was formerly Southwestern division manager for the Diversey Corp.

• **Daniel E. Bonnell,** of Denver, has been named technical representative for California and Arizona, by **U. S. Industrial Chemicals, Inc.** Dr. Bonnell formerly was president and general manager of the Western States Chemical Corp.

• **Minnesota Mining & Manufacturing Co.** has appointed A. A. Blaess to handle market development of "fabricated products," and J. M. Rogers, responsible for marketing 3M's fluorocarbon compounds.

• **Antara Products, General Aniline & Film Corp.,** has recently appointed John P. Conrad contact representative for all Government agencies. Mr. Conrad joined Antara Products in 1946, as a salesman.

NEW CHEMICAL SPECIALTIES

Descriptions of new chemical specialty products. New raw materials and intermediates are described in New Products & Processes department.

Paper Size

Monsanto develops sizing agent for quality paper.

Development of an improved engine sizing agent for quality papers by Monsanto Chemical Co. is said to offer improved sizing at lower costs. The new product, known as Mersize CD-2, is available in easily handled beater-dispensable form. It is also recommended for use in Sveen glue for headbox or saveall addition, as well as a parting agent in sodium silicate adhesives.

Lube Additive

New motor oil additive requires no dilution.

A new all-chemical additive, Aerolube 70, is available from the Petroleum Chemicals Department of American Cyanamid Co. to refiners and blenders of motor oils. It is said to be an exceptional oxidation and bearing corrosion inhibitor, and may offer economies to the oil refiner

Hooker Chlorobenzenes

Available for Prompt Shipment

Hooker manufactures five chlorobenzenes, principal of which are monochlorobenzene and paradichlorobenzene. These products are of exceptionally high quality to insure the best performance in your applications.

If you are not yet familiar with Hooker quality and service, we invite you to test these materials. Literature and samples are available when requested on your business letterhead.

PARADICHLOROBENZENE (1, 4-dichlorobenzene)



DESCRIPTION:

White to clear, transparent crystals with a pleasant aromatic odor. Soluble in most organic solvents; insoluble in water. Available in seven regular sizes.

PHYSICAL DATA:

Mol. Wt. 147
M. P. 53°C
B. P. 173°C
Flash Point 73°C
Fire Point 108°C

USES:

Recommended and widely accepted as a highly effective insecticide for agricultural and domestic purposes in control of: peach tree borer, black peach aphids, tobacco blue mold, clothes moths, carpet beetles, fish moths, garden centipedes, etc. Also used in the manufacture of sanitary specialties such as deodorants. As a chemical intermediate in organic synthesis, it is used in the preparation of a variety of chemicals, especially dyestuffs.

Technical Data Sheets on the other Hooker Chlorobenzenes: orthodichlorobenzene, hexachlorobenzene, are also available upon request.



1, 2, 4-TRICHLOROBENZENE

Tech.



DESCRIPTION:

Clear, almost colorless mobile liquid having a characteristic chlorobenzene odor. Completely miscible with most organic solvents; practically immiscible in water.

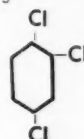
PHYSICAL DATA:

Mol. Wt. 181.5
F. P. 10°C
Dist. R. 205° to 235°C
Sp. Gr., 15.5°/15.5°C 1.465 ± .003
R. I., n₂₀/D 1.570 ± .002
Flash Point 118°C

USES:

As an insecticide, it is particularly effective as a soil poison in termite eradication; solvent for fats, oils, waxes, resins; as a heat transfer medium; in chemical synthesis for manufacture of dye intermediates and other organic chemicals.

Technical Data Sheets on the other Hooker Chlorobenzenes: orthodichlorobenzene, hexachlorobenzene, are also available upon request.



MONOCHLOROBENZENE (phenyl chloride)



DESCRIPTION:

Clear, colorless, moderately volatile liquid, with a characteristic mild odor. Completely miscible with most organic solvents; immiscible with water.

PHYSICAL DATA:

Mol. Wt. 112.5
F. P. -44°C
B. R. 131.3° to 132.3°C
Sp. Gr., 15.5°/15.5°C 1.113 ± .001
R. I., n₂₀/D 1.524
Flash Point 29°C

USES:

Intermediate in manufacture of insecticides, dyestuffs, drugs, perfumes, and other organic chemicals; solvent for paints, varnishes, lacquers; general organic solvent; heat transfer medium for condensing vapor systems.

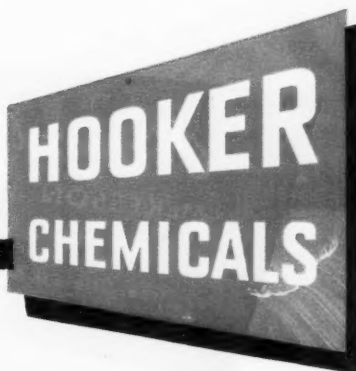


From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

3 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.

NEW YORK, N. Y. • WILMINGTON, CALIF. • TACOMA, WASH.



8-826

because it is easily handled in its pure state and therefore requires no dilution with carrier oil. This in turn conserves shipping and storage space.

Aerosol Hair Preparation

Cosmetic house introduces aerosol for beauty parlor trade.

Liquinet, "The Liquid Hair Net," produced by Liquinet Corp., Chicago, is a hair dressing preparation in solution with Freon as a propellant, and is currently being produced in a 12 oz. low pressure aerosol container (supplied by Conti-

mental Can Co.) for beauty parlor use. Later it will be sold to consumers in a 4 oz. size, either in an aluminum or tin plate container.

Liquinet is being produced in a Danville, Ill., plant on a high speed refrigerated line. The professional size sells for \$1.35, and the smaller container will be sold by the beautician for \$1.00.

Long Lasting Polish

All-purpose polish gives 4 to 7 months protection.

"The Glaze That Stays" is the adver-

tizing slogan of Palmer's Plasta Film, produced by Palmer Chemical Co., Georgetown, Tex. It can be used on any article with a finish, such as automobiles, linoleum, glassware. Principal advantages claimed are that washing the surface prior to use is not required, hard rubbing or polishing is unnecessary, and 4 to 7 months' protection is obtained.

Consumer-tested on the West Coast, Plasta Film now has national and international distribution. Drug, department, furniture, grocery stores, and others sell the 16 oz. lithographed bottle for \$1.50. In case lots, a dealer profit of 40 per cent is allowed. Sales are supported by spot radio, newspaper, mail, and point-of-sale advertising.

Wax Spray

Aerosol wax allows fast application, leaves pure carnauba film.

Sprazit Wax, believed to be the first aerosol wax marketed, is the product of Plasti-Kote, Inc., Cleveland, Ohio. In



addition to ease and speed of application made possible by the aerosol method of dispensing the product, it offers the advantage of leaving a pure wax film on a surface instead of a combination of oils, wax, and other agents, as is conventional. This is possible because the pure carnauba wax in the product is compatible with Genetron, the General Chemical Co. propellant used in the aerosol. The container is manufactured by Continental Can Co., which has developed both the can and aerosol valve.

The product, to be used on autos, furniture and other objects, is sold in a 9½ oz can for \$1.98. It is the latest of the company's Sprazit line of aerosols that includes a plastic spray, a fire extinguisher, an air conditioner and deodorant, an insecticide, and a moth proofener.

Insect-Repellent Adhesive

Packaging adhesives contain piperonyl butoxide as insect repellent.

Packaging adhesives now available with an insect repellent incorporated are proving to be of help to cereal, flour, confectionery and other manufacturers troubled with insect infestation of pack-

(Turn to page 145)

BENZOYL PEROXIDE

SPOT STOCKS
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- ★ *Chicago*
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ENJAY OXYGENATED SOLVENTS AND HYDROCARBONS

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When you order from ENJAY, you can always be sure of prompt service.

ENJAY can deliver by water, rail or truck in any quantity you may require.

Listed below are the oxygenated solvents and hydrocarbons now available for immediate shipment. The ENJAY

quality is your assurance that the products you buy are of the highest quality and meet the most rigid specifications.

For complete specifications of the products listed below, write today to ENJAY. We will be glad to supply whatever technical guidance and information you may desire.

ENJAY SOLVENTS

PETROHOL* Isopropyl Alcohol (91%, 99%)— $\text{CH}_3\text{CHOHCH}_3$
Secondary Butyl Alcohol— $\text{CH}_3\text{CHOHCH}_2\text{CH}_3$
Isopropyl Acetate— $(\text{CH}_3)_2\text{CHCOOCH}_3$
Secondary Butyl Acetate— $\text{CH}_3(\text{C}_2\text{H}_5)\text{CHCOOCH}_3$
Isopropyl Ether— $\text{C}_3\text{H}_7\text{OC}_3\text{H}_7$
Methyl Ethyl Ketone— $\text{CH}_3\text{COC}_2\text{H}_5$

ENJAY HYDROCARBONS

Butadiene— $\text{CH}_2=\text{CHCH}=\text{CH}_2$
Isobutylene— $\text{CH}_2=\text{C}(\text{CH}_3)_2$
Diisobutylene— $\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}_2\text{C}(\text{CH}_3)_2$ †
Triisobutylene— $\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}_2\text{C}(\text{CH}_3)_2\text{CH}_2\text{C}(\text{CH}_3)_2$ †

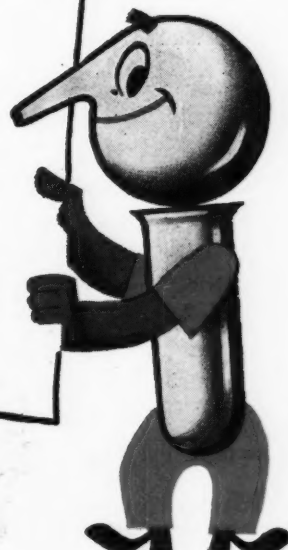
† Other isomers also present.

CTLA POLYMER—An economical heat-reactive, aromatic-type olefinic hydrocarbon. Highly unsaturated. Dries by polymerization and oxidation. Miscible in all proportions with drying oils. Compatible with most resins.

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*Trade Marks

July, 1949

NEW PRODUCTS & PROCESSES

Glycols

NP 929

Two new glycols are monoalkyl ethers of trihydric alcohols.

The initial synthesis of two new glycols has been announced by Carbide and Carbon Chemicals Corp. These glycols are substituted 1,5-pentanediols: 2-methoxymethyl 2,4-dimethyl pentanediol-1,5 and 2-ethoxymethyl 2,4-dimethyl pentanediol-1,5.

These pentanediols combine the chemical characteristics of glycols and glycol ethers. The two hydroxyl groups in the 1,5 positions make them of special interest for the manufacture of maleic and other alkyl resins, plasticizers, and elastomers. The ether groups confer solubility characteristics which make them useful as coupling agents and as solvents for protective coatings, hydraulic fluids, duplicating fluids, metal cleaners, textile dyes, and adhesives.

The water solubility and low volatility of these diols suggest their use as softeners or plasticizers for casein, zein, and other water-soluble resins.

2-Methoxymethyl 2,4-dimethyl pentanediol-1,5, when used at concentrations between 15 and 25 per cent by weight based on the total resin composition, is a plasticizer in the milling, molding, and casting of nylon resins. The finished articles possess better flexibility, increased toughness, and higher impact resistance especially at low temperatures.

Because of the unique structure of these compounds, each is expected to assume an important place in the chemical industry.

These diols are currently available in sufficient quantity for laboratory investigation and orders for five gallons or less will be filled at \$3.00 per pound, f.o.b.

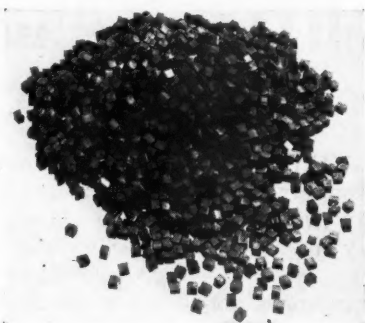
South Charleston, W. Va. By October, 1949, commercial production of these two materials will be under way permitting a selling price of less than \$1.00 per pound.

Geon Cubes

NP 930

Geon extrusion compounds in cubical form offer processing advantages.

The manufacture of certain Geon plastic extrusion compounds in uniform cubical form which, field tests show, offer users improved uniformity and better quality control of their products, has



been undertaken by B. F. Goodrich Chemical Co. Geon plastics are plasticized polyvinyl chloride resin compounds sold in ready-to-use form for extrusion, calendaring and molding.

In the wire and cable industry the new cubical granules are expected to increase considerably the efficiency of the extrusion operation and the quality of vinyl insulation. More even and complete heating of Geon plastic is made possible during extrusion because of uniform cubical

size. Porosity sometimes caused by the entrapped air in non-uniform granules is minimized.

The improved plastics are the result of a new method of granulation recently developed by engineers of the company. They will be offered for sale at no added cost.

Fluorocarbons

NP 931

3-M Co. sells small samples of perfluoropropane, -methane and -ethane.

Research samples of a new fluorocarbon gas were first offered for sale last month by Minnesota Mining and Manufacturing Co.

The compound is C_3F_8 , a colorless, odorless, non-toxic gas which boils at $-36^\circ F$. It is stable and unreactive under conditions of high pressure and high temperature. Technical data is available.

Possible applications include use as a refrigerant gas, gaseous dielectric, fire retardant, and insecticide impellent. The compound is offered for application testing only; it is not available in large commercial quantities.

The new fluorocarbon gas is made in 3M company's pilot plant in St. Paul, using the electrochemical process developed by Dr. J. H. Simons, of Pennsylvania State College. Price of the compound is \$4 per pound.

Also available now are research-size samples of the few related fluorocarbon gases now being made by the 3M company, with boiling points from $-200^\circ F$ to $28^\circ F$. Among them are CF_4 and C_2F_6 .

Malononitrile

NP 932

Schwarz Laboratories makes pyrimidine intermediate available.

Malononitrile, the nitrile of malonic acid and a starting material for the synthesis of pyrimidines, has been added to Schwarz Laboratories, Inc., list of fine chemical manufactures. To secure maximum stability the nitrile is packed in 50 gm. and 500 gm. bottles after redistillation. Larger amounts can be made to order on short notice.

Malononitrile is used widely in the synthesis of pyrimidines, purines, etc. Swedish investigators have recently reported successful use of malononitrile in the treatment of mental disorders.

Paint Improver

NP 933

Small proportion of silicone liquid prevents pigment separation.

A thin, colorless silicone liquid is helping to improve the appearance of many machines and allied industrial equipment. Designated G-E 81069 silicone, only 0.01% need be used in certain coating materials to eliminate the separation of pigments and give a more uniform painted surface.

According to the General Electric Co., paint manufacturers have long sought a means of correcting pigment separation

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 309 W. Jackson Blvd., Chicago 6, Ill. (7-9)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP929	NP932	NP935	NP938	NP941
NP930	NP933	NP936	NP939	NP942
NP931	NP934	NP937	NP940	NP943

Name (Position)
(Please print)

Company

Street

City (Zone) State



THE NAME TO WATCH IN CHEMICALS

D-40 DETERGENT

DOES WONDERS FOR THE WASH

Faster washing, easier rinsing, effective soil removal in hard or soft water are a few of the many advantages of this superior detergent. Its powerful surface action, rapid wetting times, fast penetration always assure superb cleaning jobs. D-40 helps you discover new, more economical ways to conquer tough cleaning problems. It is an excellent cleaner by itself and the performance of other cleaning agents can be substantially improved by the addition of this product. D-40 has excellent foaming properties, maintains a high degree of stability in a wide variety of media including acid and alkaline solutions. Always ask for fast action D-40 Detergent. It's high in quality, low in cost. Call or write the Oronite office nearest you for detailed information.



A typical example of improved washing methods is the use of D-40 Detergent in the washing and scouring of sheep skins. Here D-40's powerful surface active properties and excellent detergency speed washing time, give quick penetration, complete fat removal, easier rinsing. The softness and permeability of the hides is greatly increased, resulting in improved workability in further processing. The absorption of the detergent produces an excellent handle on the fleece. So if you want to improve the wash... always choose D-40 Detergent.

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Because of its unique water softening action, rapid and complete solubility, peptizing and dispersing action, Victor Sodium Triphosphate is widely used in built soaps and detergents, industrial cleaners, and water softening applications. It can be used in bar and chip soaps because of good solubility and freedom from "blooming." It is an excellent dispersant for pitch control in paper making, for dispersing clays, and for conditioning drilling muds. Ask for complete data and experimental samples. Write today, or fill in and return the handy coupon.

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V2

in oil and synthetic-based paints and lacquers. This fault causes painted equipment to reveal two or more color tones.

Because G-E 81069 is most effective when mixed with paint ingredients at the time of manufacture, it is recommended only to paint producers.

Drying Oil

NP 934

Synthetic oil is durable, stable, dries through, retains color, and is free from after-tack.

Development of a new synthetic drying oil, partly derived from vegetable oils, which can be "tailor-made" to suit a wide variety of specific requirements in paint-making is announced by Sherwin-Williams Co.

Now available as High Polymer Oil No. 11, the new product was developed primarily for use as the bodied portion of the vehicle in exterior paints since it overcomes some of the inherent disadvantages of bodied linseed or bodied soya-china wood combinations in this application.

It is claimed that the new oil, when used as the bodied portion of paint vehicles, offers exceptional advantages from standpoint of durability and package stability, through drying, freedom from after-tack, and color retention.

Because of its markedly low acid value for an oil of this viscosity, the new product is essentially non-reactive with basic pigments. This aids in stabilizing the viscosity on aging and greatly enhances the wearing quality. Unlike many bodied oils the new oil does not surface-dry, and thus decreases the tendency to wrinkle in thick films.

Although the new product was developed primarily for use in exterior paints, it may find a place in other coatings such as architectural whites and varnishes. The rapid drying and freedom from after-tack suggest its use in interior oil-type enamels as well as semi-gloss and flat wall finishes. It also may hold possibilities in both cold cut and cooked varnishes.

Vinyl Resin

NP 935

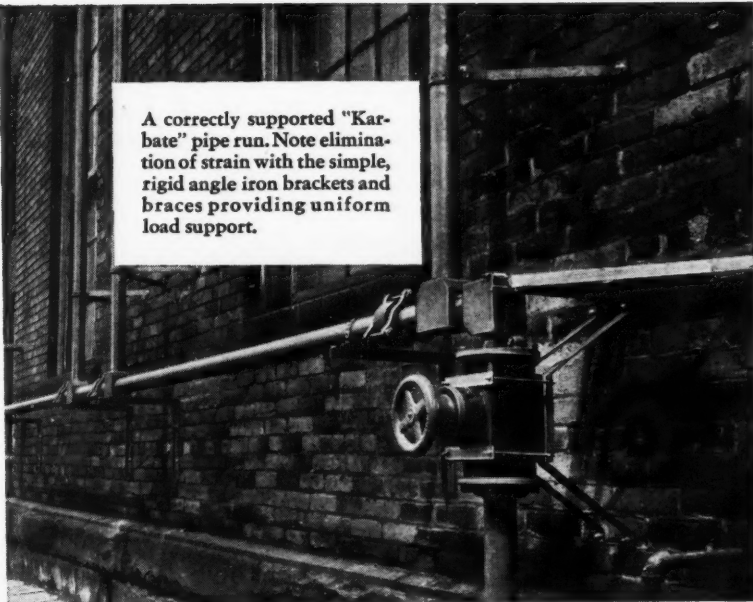
New grade of vinyl resin having wide range of possible uses announced by Bakelite Corp.

A new resin, identified as Vinylite dispersion resin NV.4, is particularly intended for use in preparation of water-based dispersions. The ease of application and versatility of the resin suggests such uses as for coating cloth to obtain tough, water-resistant materials to be used for upholstery, shade cloth and carpet backing. Paper coated with the resin should be useful in packaging applications and in the manufacture of waterproof—hence, washable—wallpaper. The dispersions also suggest coatings for various materials to be used as floor coverings.

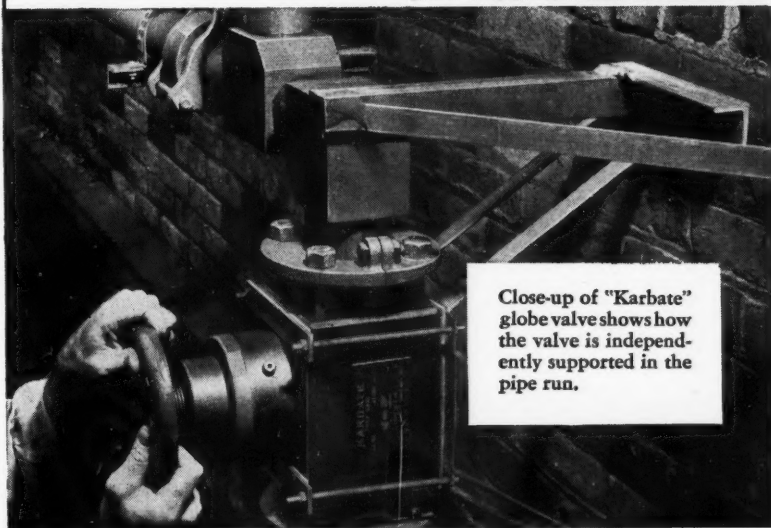
The new resin is quite similar to the VYNV and VYDR grades of vinyl resin used in preparing organosol and plastisol

How to support a "Karbate" pipe line.

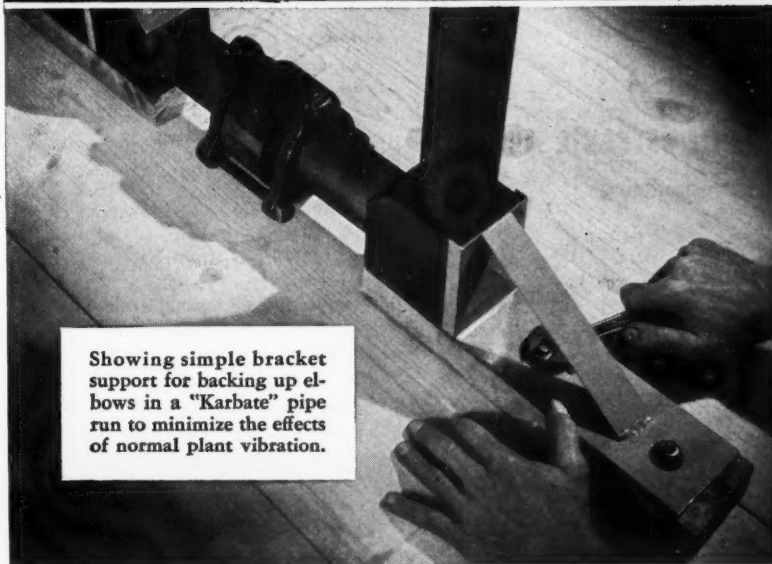
A correctly supported "Karbate" pipe run. Note elimination of strain with the simple, rigid angle iron brackets and braces providing uniform load support.



Close-up of "Karbate" globe valve shows how the valve is independently supported in the pipe run.



Showing simple bracket support for backing up elbows in a "Karbate" pipe run to minimize the effects of normal plant vibration.



KEEP "KARBATE" PIPE ALWAYS IN STOCK

- Resists the action of acids, alkalis and other chemicals
- Light weight with adequate strength
- Resistant to mechanical shock
- Immune to thermal shock
- Easy to machine and install
- Full range of sizes and fittings

Write for Installation Manual
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The term "Karbate"
is a registered trade-mark of
**NATIONAL CARBON
COMPANY, INC.**

Unit of Union Carbide and Carbon
Corporation



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Division Sales Offices:

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New York, Pittsburgh, San Francisco

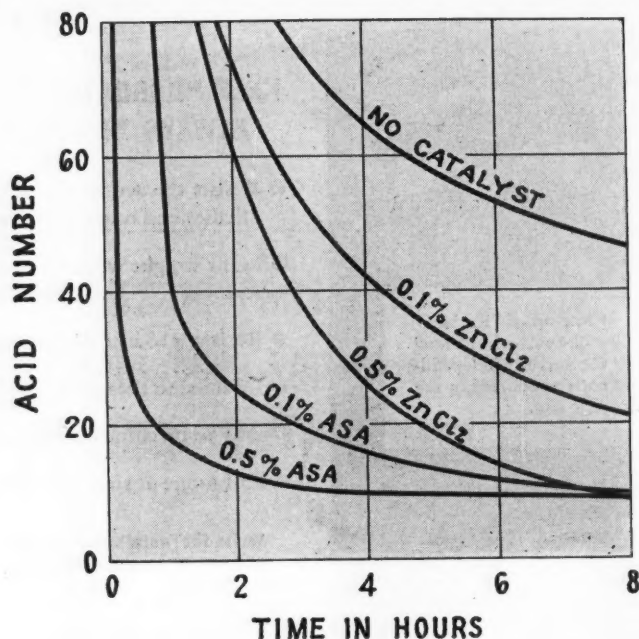
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Alkanesulfonic Acid

AN ACTIVE ESTERIFICATION CATALYST



ESTERIFICATION OF GLYCEROL-STEARIC ACID

Also an active non-sulfonating, non-oxidizing catalyst for

ACYLATION -

ALKYLATION -

CONDENSATION - POLYMERIZATION

Send for bulletin 11 and samples



INDOIL CHEMICAL COMPANY

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dispersions and solution coatings, exhibiting the same extreme toughness and chemical resistance. Being a dry resin from which stable water dispersions can be prepared as required, NV.4 avoids many of the problems inherent in handling the usual type of synthetic resin latices and offers greater latitude to the formulator.

p-Aminosalicylic Acid NP 936

TB aid and chemical intermediate commercially available from Monsanto.

p-Aminosalicylic acid, commonly known as PAS, is now available to the pharmaceutical industries in commercial quantities from Monsanto Chemical Co.

The chemical is one of the few compounds showing positive properties against tuberculosis.

With large amounts of PAS available, it will be possible for pharmacologists and clinicians to investigate its action further, particularly in conjunction with other drugs.

Potassium

Dicyanoguanidine NP 937

Corresponding free acid is strong, suggested intermediate for substituted melamines and ammeline.

American Cyanamid Company has announced the availability of potassium dicyanoguanidine in experimental quantities. First described in the literature in 1945, many of its reactions remain to be investigated. The product is a stable salt which can be readily converted to the free acid, or to other salts.

Dicyanoguanidine can be isolated as a crystalline solid which is unstable upon storage. It is readily soluble in water, and its acid strength is comparable to that of hydrochloric acid. Reactions which have been investigated include the formation of substituted melamines by the action of amines and the formation of ammeline by treatment with hydrochloric acid.

Ion-Exchange Resin NP 938

High-capacity cation exchanger achieves commercial stature.

Availability of a high-capacity cation-exchange resin in commercial quantities has been announced by the Resinous Products Division of Rohm & Haas Co. Amberlite IR-120, first introduced on a restricted basis last June, is used for domestic and industrial water softening, and for special processing applications which require a cation exchange resin of high capacity and unusual physical and chemical stability.

Polyester Resin NP 939

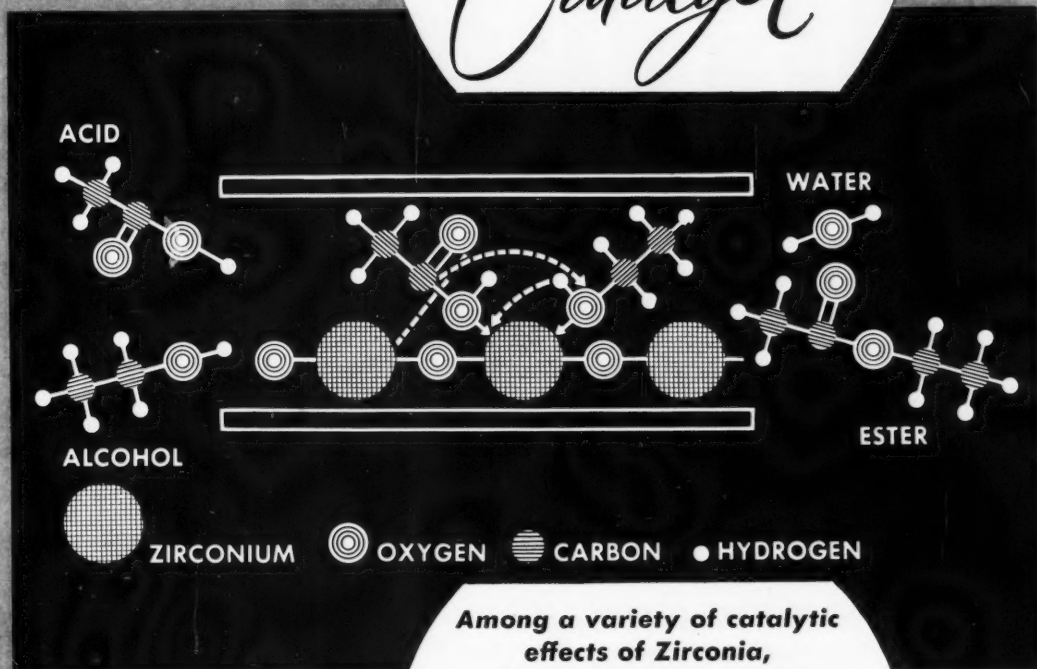
Lack of color makes thermosetting resin adaptable for new uses.

A new polyester resin that is nearly water-white has been announced by United States Rubber Co.

It makes possible clear color casting

Rapid esterification
process with high
yield utilizes...

ZIRCONIA *Catalyst*



Research results show that Zirconia catalysts are effective in speeding many organic reactions. High yields of important commercial chemicals can be realized through their use. Zirconia is an extremely stable material and can be recovered quantitatively from a reactive system in which it is employed. It is non-toxic. In many ways, it is an ideal catalytic substance for processes yielding products that require high purity.

Among a variety of catalytic
effects of Zirconia,
the best known include:

THE ESTERIFICATION OF ORGANIC ACIDS
WITH ALCOHOLS

THE PRODUCTION OF BUTADIENE

THE CRACKING OF HYDROCARBONS

THE CONDENSATION OF CERTAIN
ORGANIC ACIDS

More detailed information will be supplied upon request to our New York office where data on other T.A.M. industrial chemicals also may be obtained.

TAM

TAM is a registered trademark.

Registered

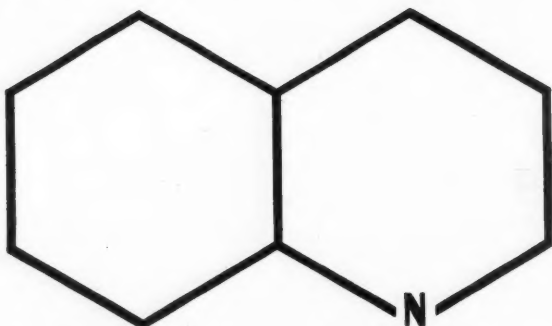
U. S. Pat. 1,987,000

TITANIUM ALLOY MFG. DIVISION
NATIONAL LEAD COMPANY

Executive and Sales Offices: 111 BROADWAY, NEW YORK, N. Y. • General Offices and Works: NIAGARA FALLS, N. Y.

REILLY

Quinoline



An interesting organic chemical with many important applications

QUINOLINE is one of the more important coal tar chemicals produced by Reilly. One of the major applications of QUINOLINE is the production of nicotinic acid. The quinolinic acid produced by the oxidation of QUINOLINE is easily converted to nicotinic acid.

AMINOQUINOLINES are receiving increasing attention in the synthesis of organic compounds. The BZ-aminoquinolines are prepared by the reduction of the corresponding nitroquinolines. The 2-, 3-, and 4-aminoquinolines are obtained by reacting the corresponding chloro- or bromo-quinolines with ammonia or amines.

8-HYDROXYQUINOLINE, a fungicide of increasing importance, is made by caustic fusion of the quinoline sulfonic acid. Other applications of QUINOLINE include the manufacture of antiseptics, antipyretics and other pharmaceuticals, dyes, insecticides and rubber accelerators.

Reilly offers two grades of QUINOLINE—90% and 95% minimum purity. Both grades are available in quantity.

Your inquiry concerning QUINOLINE or any of the many other Reilly coal tar bases, acids or hydrocarbons will have prompt attention.

Reilly Coal Tar Chemicals For Industry

REILLY TAR & CHEMICAL CORPORATION

Merchants Bank Bldg., Indianapolis 4, Ind.

500 Fifth Avenue, New York 18 • 2513 S. Damen Avenue, Chicago 8

and impregnating work which has heretofore been possible for the most part only with thermo-plastic materials, according to the company's Naugatuck Chemical Division, which developed this thermosetting resin.

Known as Vibrin 108, the new resin is said to permit decorative work with clear color and high color retention. Its low water absorption favors its use in out-of-doors applications.

When a peroxide catalyst is used, curing takes place at medium temperatures. Cures may be initiated at lower temperatures when promoters or low-temperature catalysts are used. It is adaptable to continuous laminating or to casting wherever the best color retention is required.

The resin has a color specification of 65 APHA (American Public Health Association) units.

Calcium Nitrate NP 940

Finer-size calcium nitrate crystals are lower in price.

An improved crystalline calcium nitrate is now available at the lowest price since before the war from Monsanto Chemical Co.

The improved crystals are a finer size. This permits them to dissolve faster—an important factor when they are used as a coagulant in the latex dipping process.

The price of Monsanto's crystals has been reduced 50 per cent on orders of 10 tons or more. Corresponding favorable reductions were made on smaller quantities.

The new product is also available in alcoholic solution at reduced prices made possible by the new calcium nitrate and drastically lowered alcohol schedules.

Drying Oils NP 941

Spencer Kellogg introduces linseed and soybean oil adducts of dicyclopentadiene.

Spencer Kellogg and Sons, Inc., are now offering on a commercial scale oils made by reacting linseed and soybean oils with dicyclopentadiene. It is believed that dicyclopentadiene is depolymerized by heat and that the monomer reacts with the double bonds of the oil in accordance with the Diels-Alder reaction.

The linseed-base oil will be known as Cykelin and the soybean-base as Cykelsoy.

Cykelin will be produced in a Z2 viscosity; it has a pale amber color and a low acid number. It sets in a few hours and dries extremely hard overnight. Water and alkali resistance of the films are excellent. Cykelin is completely miscible with bodied or unbodied oils, and is specifically recommended for varnishes, enamel vehicles, and as a general reinforcing oil where advantage can be taken of its fast through-dry and excellent film hardness.

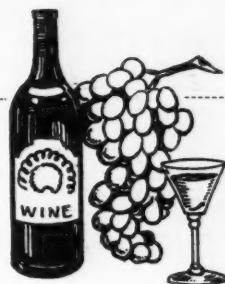
Also produced in a Z2 viscosity, Cykelsoy has a somewhat darker color. Cykel-



FIELD REPORT

Subject: Nuchar for Purification of Wines

The following notes were submitted by one of our Nuchar Activated Carbon Technicians following a recent visit to a large number of important wineries throughout the country.



1. Color removal — Ordinarily, our Nuchar C in a dosage of from 1 to 10 lbs. per 1,000 gals. of wine has been found to be quite effective in decolorizing white port, sherry, muscatel and brandies. In addition to color removal, Nuchar acts as a stabilizing agent and is also very effective for the removal of Browning agents and oxidation bodies which are responsible for color development in wines on standing.

2. Odor and flavor removal—Nuchar WA in dosages from 1 to 5 lbs. per 1,000 gals. of wine has been found to remove musty, woody, or scorched odors and flavors from wine.

3. Cloud and haze removal — Brilliant wines can be produced with Nuchar Activated Carbon in dosages of from 1 to 2 lbs. per 1,000 gals. of wine by removal of colloids and other haze bodies which are detrimental to the appearance of a wine.

4. Iron removal—Even though Nuchar grades contain small amounts of iron, they still adsorb additional iron from the wine.

5. Detannating agent — Detannated wines for pharmaceutical use can be prepared by applying a dosage of Nuchar at the rate of 20 to 40 lbs. per 1,000 gals. of wine. Nuchar C is the recommended grade for this use.

6. Claims have been made for the use of Nuchar in regard to tartrate removal. Since Nuchar is very low in calcium content, this is definitely a point in its favor as calcium impartation will tend to form a calcium tartrate haze.

7. There are also claims that Nuchar is also quite effective for copper removal in conjunction with other conditioning treatments.

Write today for a complete technical report on the use of Nuchar in the purification of wines.

Other Products: Snow Top Precipitated Calcium Carbonate • Liqro Crude Tall Oil • Indusoil Distilled Tall Oil • Tallene Tall Oil Pitch
Tallax Abietic Acid • Sulfate Wood Turpentine • Alpha Pinene • Beta Pinene • Nuchar Activated Carbon • Indulin (Lignin)

industrial

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NH₃

EXPERIENCE



WHEN YOU choose Barrett Standard Anhydrous Ammonia to supply your NH₃ needs, you are using a product which is backed by 59 years of experience.

Barrett Standard Anhydrous Ammonia is America's leading source of NH₃. Its dependable quality, consistent purity and uniform dryness have made it the standard for the chemical industry since 1890.

Barrett Standard Anhydrous Ammonia is available in two grades:

► **Refrigeration Grade, guaranteed minimum 99.95% NH₃.**

► **Commercial Grade, guaranteed minimum 99.5% NH₃.**

Both grades are shipped in tank cars with a capacity of approximately 26 tons of NH₃. Refrigeration Grade only is also packaged in 150,

100 and 50-pound cylinders. Tank car shipments are made from Hopewell, Virginia, and South Point, Ohio. Loaded cylinders are stocked at points conveniently located from coast to coast.

Barrett Standard Anhydrous Ammonia passes rigid tests for moisture, non-condensable gases and other impurities, before release for shipment. Cylinders and tank cars are thoroughly cleaned and inspected, upon return to the plant, before reloading.

The advice and help of Barrett technical service men are available to Barrett customers without charge. Free literature on Barrett Standard Anhydrous Ammonia will be mailed on request.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.



soy sets slower than Cykelin but dries very hard overnight; its water and alkali-resistance are good. Cykelsoy is also recommended for use in varnishes and enamel vehicles.

Both oils are supplied at 100% solids.

Oil Upgrader

NP 942

Varnish and alkyd finishes improved by incorporation of new material.

"Dryene" oil upgrader, made by Carbide and Carbon Chemicals Corp. (*CI Newsletter*, June, 1948), is a low-molecular-weight polyester which, under the conditions of a varnish or alkyd cook, undergoes ester interchange and dehydration to yield a product structurally similar to that obtained from a six-carbon dienolic acid. By incorporating "Dryene" in varnishes and alkyd resins, finishes with greatly enhanced properties are obtained. These finishes set and through-dry more quickly; they possess outstanding mar resistance, toughness and durability, and excellent resistance to attack by alkalies and moisture. The improvements in properties are obtained with baking and air drying finishes alike.

Orders for single 55-gallon drums are now being accepted. The price applying on this quantity is 70 cents per pound, f.o.b. South Charleston, West Virginia. As the advantages of "Dryene" oil upgrader are recognized by the surface-coating industry, and demand requires larger-scale production, it is anticipated that a substantial price reduction will be possible.

Steel Process

NP 943

"Turbo-Hearth" method combines benefits of Bessemer, open hearth.

Basic principles for making steel rapidly in a new vessel called a "turbo-hearth" have been established by pooling the research of two major steel producers. The new method, say its sponsors, Carnegie-Illinois Steel Corp. and Jones & Laughlin Steel Corp., will permit the manufacture of steel of open hearth quality, low in phosphorus and nitrogen, by directing jets of air across the surface of white-hot liquid pig iron.

The turbo-hearth was developed in an attempt to combine the advantages of the basic open hearth and acid Bessemer processes, the two leading methods followed by steelmakers in the United States. Turbo-hearth steel is made in a partly closed, side-blown vessels, lined with refractory similar to that used in the Thomas basic Bessemer process.

The brick lining of the vessel is magnesia rather than silica. As in the Bessemer process generally, heat is supplied by chemical reaction of the blown air with carbon and other elements of the charge. Chemical action is fast and direct, but subject to controlled conditions which reduce the nitrogen and phosphorus contents, making turbo-hearth steel comparable to open hearth steel.

A page from the Stauffer Catalog

NUMBER SEVEN IN A SERIES

INDUSTRIAL SULPHURS (COMMERCIAL PURITY)

"Run-of-mine" Crude

Lumps and coarse fines. Not less than 99.5% pure, free from arsenic, selenium and tellurium.

Packages:—Barrels (unlined) 500 lbs. net.

Unlined Burlap Bags—200 lbs. net.

USES: Manufacture of sulphuric acid, inorganic and organic chemicals, sulphite pulp, dyes, and insecticides.

Screened Crude Sulphur

Several grades, including—"Minus ½ inch", "Minus 8 Mesh", "Minus 10 Mesh", and "Minus 16 Mesh".

Packages—Burlap and paper bags depending on grade.

USES: Is easier to handle and use for some purposes than "run-of-mine" crude. Petroleum refining, pyrotechnics, impregnation of paper pulp, and manufacture of liquid lime sulphur are examples.

Triangle Brand . . .

COMMERCIAL FLOUR SULPHUR: Ground crude sulphur, 99.5% pure, and not less than 90% passing No. 80 U.S.S. sieve.

Packages:—Barrels (paper lined)—300 lbs. net.

Paper Bags (Multiwall)—100 and 50 lbs. net.

USES: Manufacture of glass, matches, chrome oxide pigments; and in sulphur cements, in magnesium and aluminum casting, in mixed fertilizers and stock food; in pyrotechnics and explosives; and in petroleum refining.

Superfine Commercial Flour Sulphur

Crude Sulphur of 99.5% purity, ground and air classified; two finenesses—not less than 93% passing No. 325 U.S.S. sieve or if finer material is required, not less than 98% to pass No. 325 U.S.S. sieve.

Packages:—Bags (paper—multiwall)—100 and 50 lbs. net.

USES: Generally the same as TRIANGLE BRAND, but to meet superior fineness requirements.

Stocks

*New York, N. Y.; *Freeport, Texas; *New Orleans, La.; Chicago, Ill.; Apopka, Fla.; Akron, Ohio; St. Louis, Mo.; *San Francisco, Calif.; *Los Angeles, Calif.; *No. Portland, Ore.

*Factories.

STAUFFER PRODUCTS

BHC (Benzene
Hexachloride)
Borax
Boric Acid

Carbon Bisulphide
Carbon Tetrachloride
Caustic Soda
Chlordane

Chlorine
Citric Acid
DDT (Dichloro Diphenyl
Trichloroethane)
Silicon Tetrachloride
Sodium Hydrosulphide

Sulphur (Specially
processed for all
industrial uses)
Sulphur Chloride
Sulphuric Acid
Tartaric Acid

Textile Stripper
Titanium Trichloride
Toxaphene (Chlorinated
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NEW EQUIPMENT

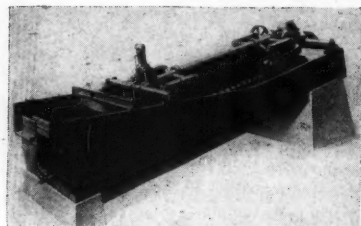
Classifier

QB 810

The new Dorr classifier, "Type H", incorporates a radically different head motion design and rake path.

The rakes, tank, feed launder and general tank arrangement of the Type H Classifier are essentially the same as those of its predecessor, the Type F. It is in the mechanical design of the head-motion and drive mechanism that it differs.

The Type H mechanism may be divided into three basic sub-assemblies: the torque tube, rocker arm and crosshead slide assembly; the drive, gear and head-motion assembly; the lifting mechanism



assembly. The torque tube, rocker arm and crosshead slide link the head-motion assembly at the discharge end of the machine and the lifting mechanism assembly near the overflow end.

The entire mechanism is supported at only three points. At the discharge end it is carried by the support tube which spans the tank and rests on two pedestal bearings. A support shaft and bearing attached to the hydraulic lifting device by a hangar rod provides the third point of support near the overflow end.

The Type H mechanism may be driven by a constant or variable speed drive, connected by conventional V-belts to a pinion shaft. Integral with this pinion shaft are two helical pinions of opposite hand which drive the gears and crank

shafts. Each crank drives a connecting rod, which, in turn, drives the rakes forward and backward.

The vertical lifting of the rakes at the end of each working stroke and subsequent lowering at the beginning of the next stroke is activated by a cam, cam roller arm and pivot shaft, contained in an oil-tight housing at the head end of the unit. The pivot shaft is bolted to the upper rocker arm, so that the oscillation of the cam roller causes the entire torque tube, rocker arm and slide assembly to rock from side to side on its centerline axis. This motion alternately raises and lowers each set of rakes in synchronization with their forward and backward movement.

The resultant rake path is that of a rectangle with rounded corners. The raking and return strokes are flat, while the raising and lowering strokes (B and D) form an ellipse.

An hydraulic lifting device is located near the overflow end of the tank, supported by a beam spanning the tank, and is operated by a small motor-driven pump with electrical push button control. Rakes are lifted 12 inches or more in HX units, the lift position being regulated by a hand lever. When the rakes are raised, the torque tube assembly pivots upward on pedestal bearings at the discharge end.

Gas Detector

QB 811

First combustible gas detector to receive underwriters' approval.

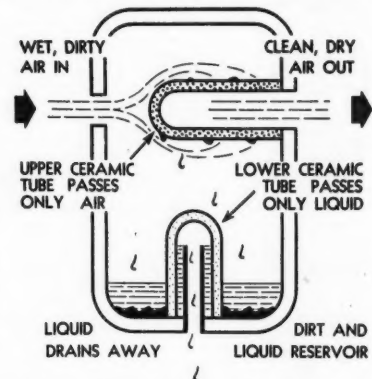
The Lor-Ann combustible gas detector and safety controller for plant protection has just been approved by the Underwriters' Laboratories. It is the first device of its type to fully pass the rigid requirements of the Underwriters. The Lor-Ann has also received the approval of the Associated Factory Mutual Fire Insurance Co.

In operation, the Lor-Ann detector continually samples and analyzes plant atmosphere for combustible gas accumulations. When gas accumulation approaches a dangerous concentration, an automatic alarm, both audible (bell and/or siren) and visible (neon signal light) is given. At the same time the Lor-Ann automatically takes over control of the plant's operating machinery, fire-fighting system, ventilation system or both depending upon the plant's particular protection requirements.

The "brain" of the Lor-Ann combustible gas detector and safety controller is contained in an air-tight and dust-proof control cabinet mounted on a self-supporting steel panel which also houses a heavy duty, rotary vane, forced feed lubricated, suction pump from which tubing leads to the gas analysis cells or "remote heads" placed at the danger points. The remote heads are placed at any distance from the main control panel, the analysis taking place in the gaseous area and instantaneously "telegraphed" to the control panel.

• QB812 Water and water-oil emulsions are removed automatically and continuously from compressed air or gas lines by the newly designed Liqui-jector, a product of Selas Corp.

Phase separation and liquid ejection are accomplished by two ceramic tubes; one water-repellent, the other water-permeable but air-impervious. Compressed



air or other gas passes through the first tube where it is stripped of its aqueous contamination and dirt. Moisture drops to the bottom of the container and drains through the second tube without loss of air.

The water ejection rates for the three sizes of the equipment vary from 0.5 to 2.5 gallons per 24 hours.

The Liqui-jector acts also as a filter, removing atmospheric dirt and finely divided solid particles, even finer than 100 microns in diameter.

• QB813 A new diaphragm pressure switch of unusual accuracy has been developed by the Industrial Instrument and Gauge Div. of The Electric Auto-Lite Co. The new switch can be made to make or break contact at an accuracy of $\pm \frac{1}{4}$ lb.

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 309 W. Jackson Blvd., Chicago 6, Ill. (7-9)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

QB810	QB816	QB822	QB828	LE139
QB811	QB817	QB823	QB829	LE140
QB812	QB818	QB824	LE136	LE141
QB813	QB819	QB825	LE137	LE142
QB814	QB820	QB826	LE138	LE143
QB815	QB821	QB827		

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gives better
Multiwall Performance



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Sacks is the result of
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BEACON HELPS YOU fight rust

TRIETHANOLAMINE
PHOSPHATE
728

ANTI-CORROSION ADDITIVE
FOR ALL TYPES OF
COOLING LIQUIDS USED
IN INTERNAL
COMBUSTION ENGINES

Characteristics: A yellow viscous liquid soluble in water, alcohols, glycols and glycerine. Sp.G. 1.30 pH (10% Aq. Soln.) 7.9-8.3

Use: 2.5% in a suitable cooling liquid will inhibit the formation of rust in airplane, automobile, marine engines and industrial cooling systems.

Write today for
experimental
sample

THE BEACON



COMPANY

Chemical Manufacturers

97 BICKFORD STREET
BOSTON 30, MASSACHUSETTS

The switch is designed to indicate pressures ranging from 10 to 25 pounds, but will be made available in other ranges.

• QB814 A new AC clamp *ammeter and voltmeter*, Model 633, Type VA-1, with five current ranges up to 1,000 amperes, and three voltage ranges up to 700 volts, has been developed by the Weston Electrical Instrument Corp.

Current measurements are made by placing the heavily insulated, trigger-operated clamping jaw around the conductor. Jaws will accommodate conductors, bare or insulated, up to 2" in diameter. Voltage measurements are made by connecting a set of clip-on voltage leads (6 leads are supplied) to the line, and to the screw-type terminals recessed in the side of the meter. Current and voltage measurements can be made almost simultaneously by rotating the thumb-selector switch to either the ampere or volt position. A pointer stop has been provided to show motor-starting currents.

To prevent shorts when measuring current on bare conductors, the jaws of the Weston clamp meter are insulated with tough rubber sleeves. Operation of the jaws is simplified by the single positive acting trigger, which can be operated by one hand when making current measurements.

The Model 633 Type VA-1 has a rated accuracy within three per cent of the full scale range (this applies to each of the eight ranges) when used on frequencies between 50 and 70 cycles.

• QB815 Trent, Inc., is now offering an improved *cartridge heater* featuring new-style pigtails and harder, shock-resistant sealing cement. The pigtails are made of Kool-Grid wire—a nickel clad stranded copper wire covered with a silicon impregnated glass sleeving. Greatly increased moisture resistance permits a much wider range of applications.

Pigtails are locked in the heater head by an especially hard cement seal that is virtually unbreakable. Opposite end of unit is brazed on. Improved construction also includes new multiple-pass porcelain core which positively locates heating coil in relation to metal shell, and provides much greater space for heating element wire. This reduces internal watts per sq. inch and prolongs the life of the heater.

• QB816 A new *Transometer* to generate an air pressure signal from 2-15 psi has been designed by the Askania Regulator Co. This new unit can be used directly with the present types of air operated controllers, eliminating the necessity for a transformer to convert the usual Transometer low pressure signals to the desired "2-15 p.s.i." values.

The new Transometer was first developed to translate liquid flows to low pressure air signals for measurement and control purposes. Combined with a positive displacement meter, it converts the RPM

of the positive displacement meter into an air pressure signal proportional to the square of the liquid flow. Since it employs a positive displacement meter for measuring the liquid flows, viscosity effects on the measurements are small compared with the viscosity effects on measurements made by the usual orifice methods.

The initial output pressure signal is adjustable from 0-3 psi and the top output pressure signal from 10-18 psi. The maximum input RPM may vary from 25-3000. Good results are possible down to 10% of the maximum RPM for which the Transometer is designed.

• QB817 A new model *conductivity bridge*, model RC-16, has been announced by Industrial Instruments, Inc. Designed for general laboratory work, this line operated AC Wheatstone bridge covers the range of measured resistance from 0.2 to 2,500,000 ohms with an effective scale length of 84." Two bridge-source frequencies, line frequency and 1,000 cycles per second are provided, with practically instantaneous switching from one to the other.

• QB818 Tempil Corp. has developed additional high temperature ratings of Tempilstiks (crayons) and Tempil pellets. Both these *temperature-indicating products* can now be obtained in the temperature range between 1600°F and 2060°F.

• QB819 The new larger size *carbon brick* of National Carbon Co. is 13½" x 6" x 3" and weighs 14.4 lb.

Other new sizes of carbon brick are also available. A new key brick, measuring 13½" x (6"-5") x 3" weighs 13.2 lb.; the 9" x 6" x 3" straight brick weighs 9.5 lb.; and the 9" x (6"-5½") x 3" key brick weighs 9.1 lb.

• QB820 A new type of *indicating controller*, the "Multi-Switch" Capacitrol, has been developed by Wheelco Instruments Co. The new instrument incorporates such features as a "Distant View Scale," front accessibility, plug-in chassis design and voltage selector plug and is available with a maximum of four switches (S.P.D.T.) to provide a selection of six different switching sequences for a large variety of control functions.

A high resistance, fully compensated, direct reading meter movement with Alnico V magnet is used for applications which fall in the pyrometric range. Models using resistance thermometer measuring systems are available for low temperature operation.

• QB821 An improved line of 125 psi bronze globe, angle and check *valves* is available by The Lunkenheimer Co. and will provide greater strength and longer service life.

The globe valve and angle valve have a malleable iron, non-heating handwheel;

MORE EVIDENCE ON HOW DURCO EQUIPMENT MINIMIZES THE COST OF HANDLING CORROSIVES

Here are more examples of how the use of Durco equipment has avoided costly replacements and shutdowns.

These photographs show what Durco means by "corrosion-resistance . . . years, even decades of unfailing corrosive-handling service. This corrosion-resistance is not provided by any coating or lining; it is inherent in the alloy of which the equipment is made. It is uniform throughout the entire wall thickness.

Durco has specialized in developing and producing corrosion-resistant alloys and equipment for services like these for the past 37 years.



This Durco pump and strainer are continuing to handle this severe abrasive and corrosive solution.

20 YEARS
HANDLING FERRIC
FERRO-CYANIDE

This Durco top lubricated plug valve is still giving trouble free service.

13 YEARS
HANDLING 20% HCL

This Durichlor pump is on the job today.

13 YEARS
HANDLING 20% HCL

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DURIRON and DURICHLOR—high silicon irons
DURIMET—a high Ni-Cr-Mo-Cu, low carbon stainless steel
CHLORIMET NO. 2—Nickel base, high molybdenum alloy
CHLORIMET NO. 3—Nickel base, high Mo, high Cr alloy
Also DURCO D 10, MONEL, INCONEL, PURE NICKEL, NI-RESIST, STEEL, and CAST IRON

DURCO EQUIPMENT INCLUDES:

CENTRIFUGAL PUMPS
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KETTLES
AND OTHER TYPES OF
PROCESS EQUIPMENT

Durco Adv. 88-GM

Send for these two bulletins. They will give you an overall look at what Durco has to offer you.



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THE DURIRON CO., INC., DAYTON 1, OHIO

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Please send me, without obligation, your bulletin 100—"Guide To Selection of Durco Corrosion-Resisting Alloys" and "General Catalog K".

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Company _____

Address _____

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BEACON HELPS YOU fight rust

TRIETHANOLAMINE
PHOSPHATE
728

ANTI-CORROSION ADDITIVE
FOR ALL TYPES OF
COOLING LIQUIDS USED
IN INTERNAL
COMBUSTION ENGINES

Characteristics: A yellow viscous liquid soluble in water, alcohols, glycols and glycerine. Sp.G. 1.30 pH (10% Aq. Soln.) 7.9-8.3

Use: 2.5% in a suitable cooling liquid will inhibit the formation of rust in airplane, automobile, marine engines and industrial cooling systems.

Write today for
experimental
sample

THE BEACON



COMPANY

Chemical Manufacturers

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The switch is designed to indicate pressures ranging from 10 to 25 pounds, but will be made available in other ranges.

• QB814 A new AC clamp *ammeter and voltmeter*, Model 633, Type VA-1, with five current ranges up to 1,000 amperes, and three voltage ranges up to 700 volts, has been developed by the Weston Electrical Instrument Corp.

Current measurements are made by placing the heavily insulated, trigger-operated clamping jaw around the conductor. Jaws will accommodate conductors, bare or insulated, up to 2" in diameter. Voltage measurements are made by connecting a set of clip-on voltage leads (6 leads are supplied) to the line, and to the screw-type terminals recessed in the side of the meter. Current and voltage measurements can be made almost simultaneously by rotating the thumb-selector switch to either the ampere or volt position. A pointer stop has been provided to show motor-starting currents.

To prevent shorts when measuring current on bare conductors, the jaws of the Weston clamp meter are insulated with tough rubber sleeves. Operation of the jaws is simplified by the single positive acting trigger, which can be operated by one hand when making current measurements.

The Model 633 Type VA-1 has a rated accuracy within three per cent of the full scale range (this applies to each of the eight ranges) when used on frequencies between 50 and 70 cycles.

• QB815 Trent, Inc., is now offering an improved *cartridge heater* featuring new-style pigtailed and harder, shock-resistant sealing cement. The pigtailed are made of Kool-Grid wire—a nickel clad stranded copper wire covered with a silicon impregnated glass sleeving. Greatly increased moisture resistance permits a much wider range of applications.

Pigtailed are locked in the heater head by an especially hard cement seal that is virtually unbreakable. Opposite end of unit is brazed on. Improved construction also includes new multiple-pass porcelain core which positively locates heating coil in relation to metal shell, and provides much greater space for heating element wire. This reduces internal watts per sq. inch and prolongs the life of the heater.

• QB816 A new *Transometer* to generate an air pressure signal from 2-15 psi has been designed by the Askania Regulator Co. This new unit can be used directly with the present types of air operated controllers, eliminating the necessity for a transformer to convert the usual Transometer low pressure signals to the desired "2-15 p.s.i." values.

The new Transometer was first developed to translate liquid flows to low pressure air signals for measurement and control purposes. Combined with a positive displacement meter, it converts the RPM

of the positive displacement meter into an air pressure signal proportional to the square of the liquid flow. Since it employs a positive displacement meter for measuring the liquid flows, viscosity effects on the measurements are small compared with the viscosity effects on measurements made by the usual orifice methods.

The initial output pressure signal is adjustable from 0-3 psi and the top output pressure signal from 10-18 psi. The maximum input RPM may vary from 25-3000. Good results are possible down to 10% of the maximum RPM for which the Transometer is designed.

• QB817 A new model *conductivity bridge*, model RC-16, has been announced by Industrial Instruments, Inc. Designed for general laboratory work, this line operated AC Wheatstone bridge covers the range of measured resistance from 0.2 to 2,500,000 ohms with an effective scale length of 84." Two bridge-source frequencies, line frequency and 1,000 cycles per second are provided, with practically instantaneous switching from one to the other.

• QB818 Tempil Corp. has developed additional high temperature ratings of Tempilstiks (crayons) and Tempil pellets. Both these *temperature-indicating products* can now be obtained in the temperature range between 1600°F and 2060°F.

• QB819 The new larger size *carbon brick* of National Carbon Co. is 13½" x 6" x 3" and weighs 14.4 lb.

Other new sizes of carbon brick are also available. A new key brick, measuring 13½" x (6"-5") x 3" weighs 13.2 lb.; the 9" x 6" x 3" straight brick weighs 9.5 lb.; and the 9" x (6"-5½") x 3" key brick weighs 9.1 lb.

• QB820 A new type of *indicating controller*, the "Multi-Switch" Capacitrol, has been developed by Wheelco Instruments Co. The new instrument incorporates such features as a "Distant View Scale," front accessibility, plug-in chassis design and voltage selector plug and is available with a maximum of four switches (S.P.D.T.) to provide a selection of six different switching sequences for a large variety of control functions.

A high resistance, fully compensated, direct reading meter movement with Alnico V magnet is used for applications which fall in the pyrometric range. Models using resistance thermometer measuring systems are available for low temperature operation.

• QB821 An improved line of 125 psi bronze globe, angle and check *valves* is available by The Lunkenheimer Co. and will provide greater strength and longer service life.

The globe valve and angle valve have a malleable iron, non-heating handwheel;

MORE EVIDENCE ON HOW DURCO EQUIPMENT MINIMIZES THE COST OF HANDLING CORROSIVES

Here are more examples of how the use of Durco equipment has avoided costly replacements and shutdowns.

These photographs show what Durco means by "corrosion-resistance . . . years, even decades of unfailing corrosive-handling service. This corrosion-resistance is not provided by any coating or lining; it is inherent in the alloy of which the equipment is made. It is uniform throughout the entire wall thickness.

Durco has specialized in developing and producing corrosion-resistant alloys and equipment for services like these for the past 37 years.



20 YEARS
HANDLING FERRIC
FERRO-CYANIDE

This Duriron pump and strainer are continuing to handle this severe abrasive and corrosive solution.

13 YEARS
HANDLING 20% HCL

This Duriron top lubricated plug valve is still giving trouble free service.

13 YEARS
HANDLING 20% HCL

This Durichlor pump is on the job today.

DURCO ALLOYS INCLUDE:

DURIRON and DURICHLOR—high silicon irons
DURIMET—a high Ni-Cr-Mo-Cu, low carbon stainless steel
CHLORIMET NO. 2—Nickel base, high molybdenum alloy
CHLORIMET NO. 3—Nickel base, high Mo, high Cr alloy
Also DURCO D 10, MONEL, INCONEL, PURE NICKEL, NI-RESIST, STEEL, and CAST IRON

DURCO EQUIPMENT INCLUDES:

CENTRIFUGAL PUMPS
VALVES
PIPE AND FITTINGS
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STEAM JETS
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KETTLES
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PROCESS EQUIPMENT

Durco Adv. 88-GM

Send for these two bulletins. They will give you an overall look at what Durco has to offer you.



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DAYTON 1, OHIO
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THE DURIRON CO., INC., DAYTON 1, OHIO

Gentlemen:

Please send me, without obligation, your bulletin 100—"Guide To Selection of Durco Corrosion-Resisting Alloys" and "General Catalog K".

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hexagon head gland which eliminates "prying" when repacking; machined repacking seats; solid bronze discs which are renewable on $\frac{3}{4}$ " and larger sizes. Large clearance at end of pipe threads permits tight joint without danger of pipe jamming diaphragm. Laboratory wear tests plus records in actual field service, prove that stems of the silicon bronze alloy used outlast other stems.

The lift check and swing check valves have similar features of strength and design. In the lift check guide lugs on the disc and guide sleeve in cap assure positive seating. The swing check has two renewable side plugs which serve as bearings for the disc carrier pin. Misalignment of the carrier pin due to natural wear can be corrected by renewing the side plugs. The two side plugs also permit removal of the disc carrier pin from either side—particularly advantageous when valves are installed close to a wall or other obstruction.

• QB822 A new *velocity limiting valve* for high limits of flow velocity and volume has been introduced by Pneu-Trol Devices, Inc. It is easily connected into any air or gas line. When set to any of its infinite number of pressure calibrations it instantaneously shuts off line flow whenever the velocity or volume exceeds the desired setting.

A stainless ball is pulled up against its seat and held in the "closed" position by

line pressure whenever the flow exceeds the setting. When the pressure is exhausted, the ball drops off its seat and re-sets itself. Screwing the adjusting screw in or out of the valve lowers or raises the pressure setting at which the valve closes. It is available in $\frac{1}{4}$ " pipe size—(other sizes special order), made of brass bar stock with stainless steel parts and internal fittings.

• QB823 A light weight, and entirely self-contained, the type RB dry cell operated, *portable Solu-Bridge*, is now available in some 80 different ranges and calibrations, from Industrial Instruments, Inc. Like the line operated Solu-Bridge, this instrument is an AC Wheatstone bridge, provided with a manual temperature compensator and a main scale calibrated either in conductance units or in terms of the concentration of some single electrolyte. An electron ray "eye" tube is utilized as the null indicator.

• QB824 Pioneer Rubber Co. is now producing a new Stanzoil—*industrial glove*—the NL-52 heavy duplex. It is specifically designed to fill demands for a heavy weight, extra large size, extra length industrial glove with an elastic knit lining.

The new NL-52 is furnished in sizes 10 and 11, is made of elastic, knit-lined neoprene, and is 14 inches long. The fingers are straight and coated with the Pioneer non-slip finish.

• QB825 New controls have been added to Coral Designs' line of standard sensitive *static pressure controls*. They are for application on very low pressures where regulation is required in inches of water either pressure or vacuum. They may be used to control the static pressure in the intake of a duct, to measure and actuate an alarm when the drop across a filter reaches some pre-determined value, etc.

Units are obtainable in standard ratings ranging from 0" to 20" of water column pressure or vacuum with range adjustment, and with fixed or variable differentials of .2" to 2" of water. They are also available with double throw circuits or floating contacts for use in connection with reversing type damper control motors.

• QB826 Filtration Fabrics Division, Filtration Engineers, Inc., is now producing new *filter fabrics* of Feon Orlon. They are excellent for strong mineral acids, common solvents, oils, greases, and acid solids. Feon Orlon fabrics come in a wide range of weaves, are easy to clean, non-blinding, and will last considerably longer than previously available cotton cloths.

• QB827 A greater range in the types of materials handled by the *rotary pumps* manufactured by Blackmer Pump Company is now possible with the addition of



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ALWAYS NEW FRONTIERS *for* POWELL

When the Oklahoma Territory was opened at 12 noon on April 22, 1889, more than 20,000 people were lined up on the border. At a signal by U.S. Cavalry, a remarkable race for homesteads ensued.

Fig. 1969—150-pound Stainless Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke-bonnet and tapered solid wedge.

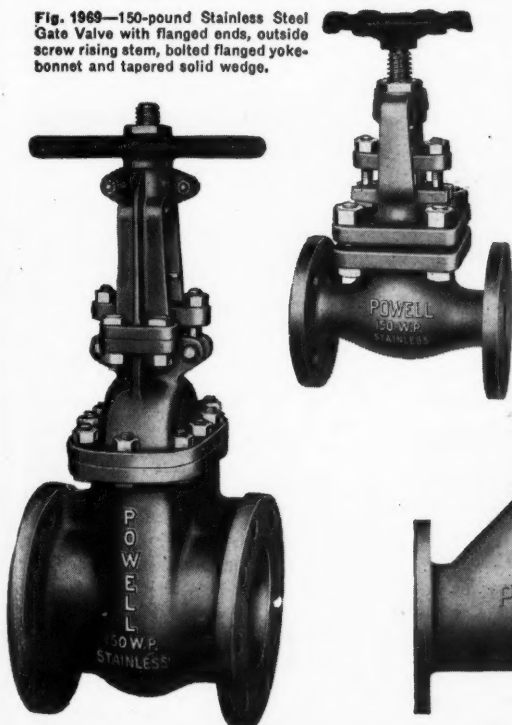


Fig. 2453-G—Large 150-pound Stainless Steel Gate Valve with bolted flanged yoke-bonnet, outside screw rising stem and tapered solid wedge. Made in sizes 5" to 30", inclusive.

The amazing development of the United States has been a result of continually opening new frontiers—not only geographical, but scientific and industrial as well. In the latter sphere, The Wm. Powell Company has a long and proud record of settling the flow control requirements of each new industrial frontier as it has appeared—including such achievements as inventing the first regrinding globe valve, pioneering in the field of corrosion resistance, meeting the need for specially designed valves for special services, and many others.

As a result of this continual pioneering, *only* Powell makes such a complete line* that no matter what your flow control requirements may be, Powell has the valves to meet them. Moreover, Powell Engineers are always ready to help you solve any problems that might arise.

* Powell Valves are made in Bronze, Iron, Steel and a wide selection of Corrosion-Resistant metals and alloys. Valves of every type—Globe, Angle, Gate, Check, Non-return and Flush Bottom Tank Valves—are included in the Complete Powell Line.

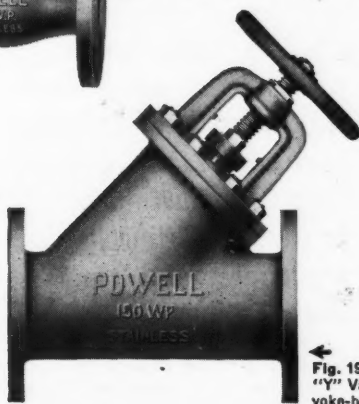


Fig. 1944—Large 150-pound Stainless Steel "Y" Valve with flanged ends, bolted flanged yoke-bonnet and outside screw stem.

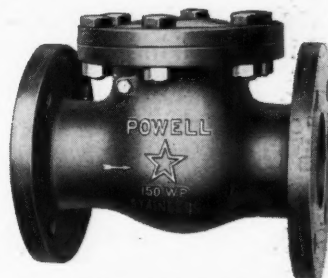


Fig. 2433—150-pound Stainless Steel Swing Check Valve with flanged ends and bolted flanged cap.

The Wm. Powell Company, Cincinnati 22, Ohio

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POWELL VALVES

a "sliding" vane type to their standard "bucket" or "swinging" vane type. Both high and low viscosity liquids are said to be successfully pumped with the new type. Vanes are positively actuated by push rods through the rotor and shaft.

"Sliding" vanes can be furnished in a sound-deadening, nonmetallic material in most instances, which are claimed to be relatively more quiet and wear resistant than conventional metal vanes.

- QB828 Brooks Rotameter Co. offers a new Multi-Tube *rotameter* which can be built with two or more rotameter tubes in it for use on related flows. The standard Brooks Full-View rotameter end fittings are fastened to a metal back plate. The front is shielded with a plastic window, 1/4" thick. Each tube with its fit-

tings may be removed without disturbing any of the other parts.

The new rotameter is proving very effective for such applications as "Reflux" and "Product" in a continuous still, "Gas" and "Air" flows to an atmosphere furnace, water to a battery of coolers, continuous dilution, continuous purging, feeds to parallel filters and many other services where two or more flows have a direct relationship to each other.

- QB829 "Acid splash" has been licked by the new "Wahlert safety carboy drainer." It is used in conjunction with Wahlert's "carboy tilter" to handle acids without spill and splash. Its soft rubber neck fits different sized carboys; and the vent and spout are made of hard, durable, acid-proof rubber. Three sizes are avail-

able—the "Junior" for five gallon carboys with 1 3/4" to 2 1/4" neck, the "Standard" for 10 to 13 gallon carboys with 2 3/4" to 3" necks and the "Large" for 13 gallon carboys with 3 1/4" to 3 1/2" necks.

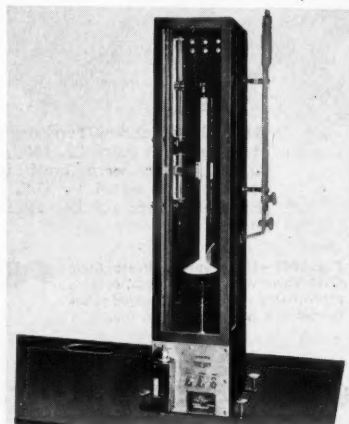
LABORATORY EQUIPMENT

Evaporometer

LE136

New meter determines solvent evaporation.

The "Precision"-Shell Evaporometer was developed for the determination of



evaporation rates of all solvents with a viscosity less than 100 cp. and the solvent release characteristics of resin solutions.

The automatic filling microburet releases a sample on the filter paper cone which is suspended from a helical quartz spring and is rotated by a motorized electromagnet to distribute the sample evenly. After the cone is "freed," the sensitive spring rises as the sample evaporates.

Knobs on the outside of the case raise or lower the spring and cone assembly, the centimeter scale, and the mirror. When the sighting disc just above the cone and its reflection are aligned with a scale calibration, an exact height reading is obtained.

The case is fitted with an outlet for a timing mechanism which can be operated by a switch on the nameplate panel. All switches are conveniently located on this panel.

The volume of air drawn through the apparatus is indicated and controlled by an adjustable rotameter. A serrated hose connection at the base is provided for connection to a vacuum line.

- LE137 Two newly developed *testing thermometers* are offered by the Taylor Instrument Co., to meet the specifications of the American Petroleum Institute Code (25 and ASTM 58F-48T and 59F-48T). Although these thermometers are specifically designed for measuring, sam-

ISCOOPERATION News

JULY, 1949

Where Can You Find a BETTER Gum Arabic?

Yes, where is there a better source for this best known of all the water soluble gums than Innis, Speiden. Long a specialist in supplying every gum requirement, Innis, Speiden carries large stocks in New York, Jersey City and in every branch office. Isco Gum Arabic comes in cleaned amber sorts, fine grained, bold grained, special grained (All-blown and sifted), U. S. P. White Powder

No. 1 (fine powder and granular), White Powder, No. 2 Grade Crushed. Complete information on properties and uses of ISCO Gum Arabic is available in our special Gums Booklet. Write for your copy today. Our research department will be glad to outline special procedures for special uses.

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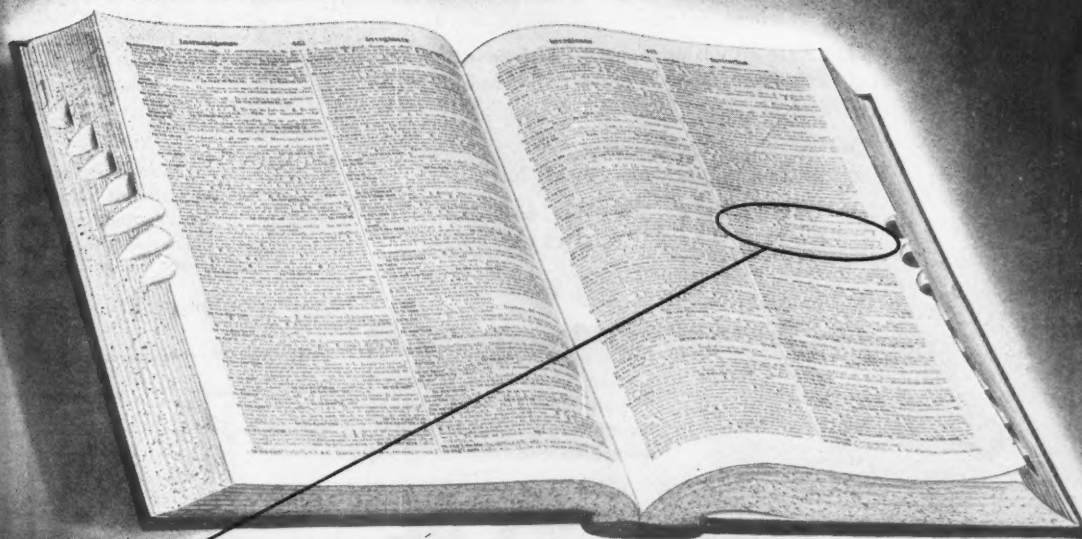
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Why We Say CHEMICO PLANTS ARE PROFITABLE INVESTMENTS



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Webster defines an investment as "the investing of money or capital for income or profit." In the heavy chemical field, Chemico is a proved translator of *investment* into profit. Here's why:

Every Chemico-built plant is planned and designed to fit individual needs.

Each plant is designed by engineers and technologists of recognized authority.

Chemico's advanced processes and selection of equipment insure high efficiency of operation...and, where necessary, new processes and facilities are developed to meet special circumstances.

Chemico brings to bear on each new project its 35 years of experience in constructing a wide range of heavy chemical installations.

Chemico turns the plant over to

the purchaser only after over-all performance guarantees have been met. But initial performance is not enough. Chemico also trains the client's staff in every phase of operation.

Chemico takes full responsibility for the job...from initial investigation to completed project.

These are some of the reasons why owners have found that "*Chemico Plants are Profitable Investments.*"

Before deciding to build a new heavy chemical plant or remodel an old one, it will pay you to consult Chemico.

CC 186

Typical Chemico Undertakings

PLANTS FOR PRODUCTION OF

SYNTHETIC AMMONIA
SYNTHETIC METHANOL
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Built to take the punishment of sulphuric, nitric, mixed, heavy and other acids — and service on all acid-handling pumps and valves. Select long fibre pure blue asbestos . . . each strand impregnated with special acid-resisting self lubricant. Will not score, overheat, or nitrate. Plaited, twisted, ring.

Let Palmetto Blue Asbestos also take the bite out of acid problems as pressure-bonded Sheet, as Dry Blue Rope.

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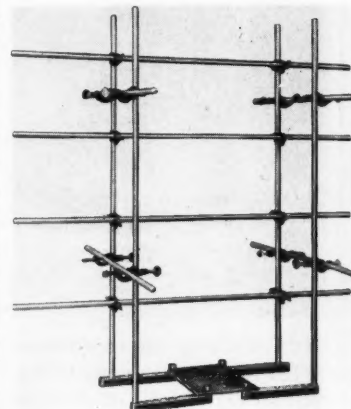
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Palmetto distributor on all pack-
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our special tools.

pling and testing crude oil, they are expected to find use as general test thermometers.

The new 16 $\frac{3}{4}$ " cup case thermometers (ASTM 58F-48T and 59F-48T) are manufactured in 2 ranges; —30 to —120°F and 0-160°F, with a guaranteed accuracy of $\pm 0.5^\circ\text{F}$. Taylor Binoc tubing together with the large figures and clearly marked 1° scale divisions make extremely easy reading. The ample, 100 cc., non-sparking brass cup holds sufficient sample at the proper immersion of the thermometer tube to maintain the temperature while sampling is made.

The armored thermometers are 12" long with the accurately made Binoc etched stem thermometer encased in non-sparking brass armor. Ranges: —30° to +120°F and 1-180°F. (ASTM 58F-48T and 59F-48T).

• LE138 An advanced laboratory support designed for complete flexibility has been developed by the Precision Scientific Co. Not only useful as a ring stand, the "Quod-Pod" can be manipulated to sup-



port special and complex laboratory set-ups.

The flexibility is derived from two basic ideas: (1) the legs and bases are interchangeable—two bases can be joined with common legs; (2) the legs are movable through an arc of 270°—the four legs can be folded under the base.

To further the basic ideas, the bases and legs are joined by a single cap screw for each leg. Also, each base has 7 and each leg has four threaded $\frac{1}{2}$ " holes to accommodate rod uprights. The vertical rods are made of steel, aluminum or brass in two-, three-, four-, five-, and six-foot lengths. Rods can be finger-tightened, and conventional clamps can be used.

The support base is stamped from $\frac{1}{4}$ " steel plate and finished in brown Hammerloid, a baked enamel. The $\frac{3}{4}$ " square legs are made from aluminum bar and have a scratch-brushed finish.

• LE139 Panray Corp. is now offering a complete line of standard laboratory ware made of transparent quartz. Panray quartzware is chemically inert to almost

TETRAHYDROFURFURYL ALCOHOL Will Help You!



A High Boiling, Water Miscible, Primary Alcohol

DESCRIPTION

A limpid, water miscible liquid with a mild odor and light color.

PROPERTIES

Boiling Point (pure) °C (743mm) . . . 177.5
Specific Gravity (20/20°C) 1.064
Flash Point (open cup) °C 75-80
Refractive Index (n 20°/D) 1.4505
Surface Tension 25°C (Dynes/cm) 36.5 \pm 0.5

Viscosity At 25°C (Centipoises) 5.49

AS A REACTANT

Tetrahydrofurfuryl alcohol (THFA) is an important starting point for the preparation of high boiling esters and ethers where its function is that of a primary alcohol. Less explored, but of growing recognition are the reactions which take place by reason of its five membered heterocyclic ring structure. Examples include: (A) Replacement

of the nuclear oxygen with sulfur or nitrogen forming tetrahydrothiophene and pyrrolidine compounds. (B) Ring opening to form open chain compounds. (C) Ring expansion to yield dihydropyran.

AS A SOLVENT

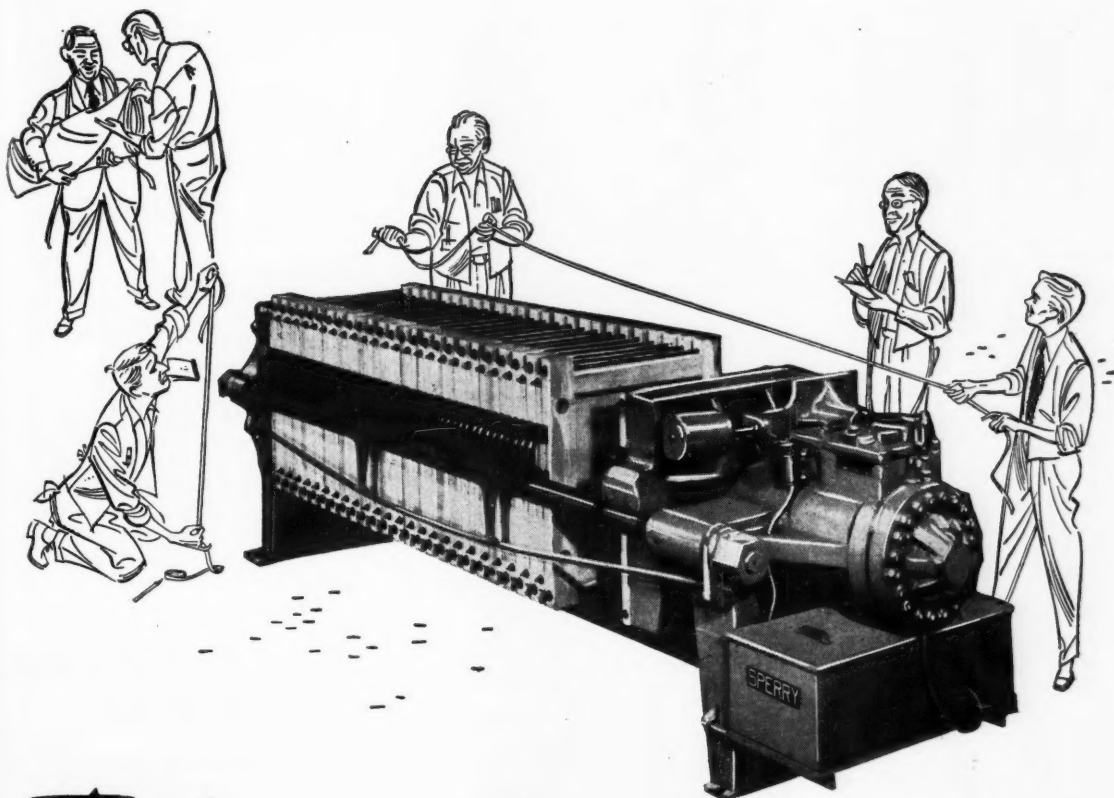
High boiling point and miscibility with water make tetrahydrofurfuryl alcohol a unique solvent. It is a solvent for chlorinated rubber, cellulose acetate, and other cellulose esters, styrene resin, vinyl acetate, vinyl butyral, ester gum, rosin, shellac, and many other resins and complex organic materials. Write or phone for information. Technical bulletin No. 87-A gives a short sketch of characteristics, and outlines some of the uses. Reaction chart No. 4 is also available. Ask for copies of each. Address your request to nearest office.



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Most Sperry Filter Presses are made to order . . . especially designed to fit your particular requirements. With more than 50 years experience and using advanced techniques, Sperry can determine scientifically the type and amount of filtration equipment you need. The result is lower operating costs and greater production efficiency.

The Sperry Plate Filter Press is available in a wide range of materials and sizes. And, because of its many advantages — such as low initial cost, ease of operation, flexibility in use, and uniformity of product — it has become the most widely used filter today.

Whatever your filtration problem, call on Sperry. An analysis costs you nothing and increased manufacturing efficiency may result.

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LEATHER FINISHING COMPOUNDS
FIRE RETARDING COMPOUNDS

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all reagents (except HF), and is highly resistant to thermal shock. The quartz-ware is especially recommended for use in micro work.

- LE140 Emil Greiner has developed a set of "potameters" to answer practically all the needs of the laboratory for accurate and convenient measurement of flow.

By means of three instruments, each containing a glass and a stainless steel ball, a range of air flow from 3 to 110,000 cc/min. is covered. The same instruments may be used for liquids and will cover a range of water flow from .064 to 3,800 cc/min. For those who require an all glass instrument because of extreme corrosive conditions, instruments with a single glass ball also are available. Each instrument is supplied with a ground glass male and female outlet so that all glass connections may be made as well as the conventional rubber tube connections.

Instruments are supplied with a complete set of calibration curves for air and water and correction charts for determining the flow of all other gases and non-viscous liquids (viscosities not too much in excess of that of water), for which only the densities need be known.

- LE141 The new Hevi Duty muffle furnaces are designed primarily for general laboratory requirements. The new muffle furnace is housed in a cylindrical shell mounted on a pyramidal type base with practically line contact between them . . . allowing free circulation of air and eliminating trapped heat in the base. Other improvements are: Instruments and controls at approximately room temperature. Improved insulation design cuts radiation loss. There are 36 steps of control. Recessed position of controls affords full protection. Instruments are easily accessible through removable panels.

- LE142 An all glass flash evaporator expressly designed for the laboratory is now being offered by the Emil Greiner Co. The new evaporator operates in principle in the same manner as modern industrial and pilot plant long tube or film-type evaporators.

It is operated under reduced pressure to lower the temperature of evaporation. In addition, the time of contact at evaporation temperatures is very short, reducing decomposition of heat levels.

- LE143 A new, miniature electric pump has been developed by the Samuel S. Gelber Co. for moving liquids of oily, acid or alkali content. The height is 14 $\frac{1}{8}$ " and the weight is 9 $\frac{3}{4}$ lbs. It is powered by a 1/30th HP motor. It is a bearingless pump—only one moving assembly with a self cooling continuous duty motor. Double inlets at top and bottom of pump prevent clogging. The pump has a stainless steel, ground and polished 1-piece shaft. Open impeller design will handle reasonable amounts of solids.

Newark "END-SHAK" TESTING SIEVE SHAKER

Bring your laboratory and plant operating results into closer relationship by applying the same fundamental principle of screening to both.

With "END-SHAK" the sieves are given an ideally combined reciprocating and turning motion which causes the sample to spread uniformly over the sieve area eliminating jumping and bouncing of the particles. Operation is smooth and with all working parts submerged in oil, noise and wear are reduced to a minimum.

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PACKAGING & SHIPPING

by T. PAT CALLAHAN

Bureau Reports Gains in Shipping Hazard Reduction

Considerable progress has been made over the past year in reducing hazards in the movement of chemicals and other dangerous articles within the United States. This record of achievement is for the chemical industry the highlight of the Annual Report of the Chief Inspector of the Bureau of Explosives, the agency concerned with safe transportation of explosives and other dangerous articles.

The following summary of activities of the Bureau will illustrate the volume and variety of work it performs:

in which they are shipped the only hazard is radiation that may escape from them. In the event of actual breakage of a container and spilling of the radioactive substance, articles upon which it is spilled will appear to be radioactive from readings taken by measuring instruments, but the activity is due to the radioactive material itself rather than induced radioactivity in the second substance.

After the spilled radioactive material is completely removed, there will be no activity in the area, but under some circumstances it may be extremely difficult if not impossible to remove the radioactive substance. For that reason it is necessary

SUMMARY OF ACTIVITIES

	1948	1947
Full and Associate Members, Bureau of Explosives	200	308
Railroads, Affiliated members of Bureau	6	6
Steamship lines, members of Bureau	1	1
Express companies, members of Bureau	3	3
Affiliate members of Bureau	102	102
Bureau Inspectors in field work	34*	36*
Total number of routine inspections:	29,512	31,924
Railroad freight stations	5,709	5,860
Railroad yards	1,865	1,976
Explosive factories, refineries, acid, compressed gas plants, etc.	1,092	1,439
Express offices and depots	2,158	2,297
Steamship piers	9	10
Storage magazines for explosives	712	597
Tank car loading or unloading locations	1,910	1,799
Cars containing explosives	543	484
Cars containing dangerous articles other than explosives	15,137	17,003
Other inspections	377	459
Cars containing explosives showing serious violations of the regulations	29	47
Boxes of high explosives condemned as unsafe for transportation	205	2,462
Kegs of black powder condemned as unsafe for transportation	24	28
Conferences with railroad officials	5,653	6,230
Conferences with express officials	546	828
Conferences with shippers, container manufacturers, etc.	10,940	10,628
Lectures and meetings addressed on the subject of safe transportation of explosives and other dangerous articles	72	115
Attendance at the lectures and meetings	3,144	4,387

* 1 Inspector with 6 months' service or less.

Numerous varieties of radioactive materials have been added to the long list of other dangerous articles now moving in rail transportation. Contrary to a rumor which gained some publicity, there has been no serious accident as the result of the rail transportation of these materials. The I.C.C. Regulations do not permit the shipment of radioactive materials other than ores, residues or similar substances of low activity in rail freight service, with the exception of those materials which are relatively harmless and, therefore, are exempt, or those materials which necessarily must be shipped by rail freight and which are handled under special arrangements with the Bureau.

The work of the Bureau included allaying the fears of persons alarmed at the possibility of radioactive materials exploding, or causing other materials to become radioactive. The radioactive materials for which rail freight and rail express shipments are authorized will do neither under transportation conditions; so long as they remain in the containers

that care be taken in decontaminating such areas, and the Bureau of Explosives must be notified immediately when such substances are spilled or packages seriously damaged. In such circumstances when necessary the Bureau of Explosives will request assistance from the shipper or other qualified persons to make certain that all necessary precautions have been taken. The radioactive ores and residues normally shipped by rail freight in car-load lots are not of such nature as to be likely to cause injury to persons under any normal conditions.

Amendments Submitted

During the year, 276 amendments to the regulations for the transportation of explosives and other dangerous articles were submitted to the Interstate Commerce Commission and were approved and published. The majority of these amendments were occasioned by continued emergency conditions or the development of new chemicals.

Reports received during the year show

that carriers were obliged to transfer contents of 187 tank cars loaded with dangerous articles, due to defects discovered in transportation which rendered further movement of the cars unsafe or which resulted in leakage of the contents. In each case the matter was reported to the owner of the tank car to make certain that necessary repairs would be made before the car was again placed in service.

Chief Inspector H. A. Campbell ends the report with a statement of results which can be gained by working together in the common interest of safety in the following manner:

"We have continued to receive the valued assistance of the Compressed Gas Association, the Manufacturing Chemists' Association, the Institute of Makers of Explosives, the American Petroleum Institute, the Chlorine Institute and the Agricultural Fungicide Association as well as that of many of the individual associate members of this Bureau and their efforts are gratefully acknowledged. The splendid record which has been maintained through years when conditions have been far from normal, particularly in that no persons have been killed for three years due to the transportation of explosives and other dangerous articles of all classes, speaks well for the results which can be gained by working together in the common interest of safety and is a credit to the railroads and shippers in the United States and Canada.

"We have continued to receive the co-operation of the Board of Transport Commissioners for Canada, the United States Coast Guard and the Interstate Commerce Commission in the endless task of maintaining up-to-date, practical and uniform regulations to assure the safe transportation and handling of explosives and dangerous articles."

New Data Simplifies Floor Strength Check

To help users of industrial power trucks determine whether their floors—particularly secondary floors—will support power-truck operations, The Yale & Towne Manufacturing Co. has recently conducted extensive floor loading tests. The new data provides a quick method of approximating safe floor capacities when subjected to power-truck operations. It helps the engineer to choose equipment in permissible weight ranges and to select suitable unit-load weights for safe operations.

Tests pertain particularly to the concrete slab type of floor construction which most architects claim is one of the most desirable types for industrial plants.

If the results of preliminary computations as carried out below are close to the floor loading capacity, a consultant should be engaged before installing a truck system.

Tests show that the common types of

Have Packaging Problems got you up a tree?

Throughout the chemical industries,
St. Regis Multiwall Paper Bags are providing
new answers to both new and old packaging problems.

ST. REGIS PACKAGING

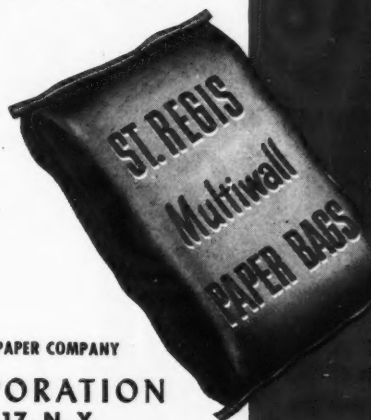
- ★ cuts labor and container costs
- ★ provides chemical products with specific protection against specific hazards (moisture and contamination, for instance)
- ★ speeds packaging operations

No wonder producers of more than 400 different commodities rely on rugged, economical Multiwalls to deliver the goods in better condition.

If there isn't a St. Regis Multiwall *now* that meets the exact requirements of your product, we probably can *make* you one. St. Regis Research and Development men will be glad to talk over your particular problems, with no obligation on your part—glad to help engineer a bag that meets your specific needs. Just get in touch with your nearest St. Regis Sales Office.

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St. Regis Multiwalls and St. Regis Valve Bag Filling Machines are the logical combination for swift, efficient, economical packaging. If you pack a granular, pulverized or powdered product, it'll pay you to find out about a complete St. Regis Packaging System. Full details are yours for the asking, from your St. Regis Sales Office.



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You Buy Protection When You Buy Multiwalls

industrial power trucks in use today impose a dynamic load to the floor approximately $1\frac{1}{2}$ times the static weight of the loaded machine. Considering the truck as a concentrated load, the bending moment is about 2 times the bending moment for uniform loading. These two factors indicate that industrial power truck operations introduce floor stresses 3 times those presented under uniform loading conditions.

To determine the truck-load which a floor will carry, the area of space devoted to aisle in one bay is considered. For example, a 20' x 20' bay having a 10' aisle and rated floor capacity of 250 lbs. per sq. ft. would allow a static load of 20' x 10' x 250 lbs./sq. ft. or 50,000 lbs. Applying the factor of 3 this would allow a truck weight of 16,600 lbs. Just how much of this weight will be apportioned to truck and how much to load will depend upon the type of load and upon the type of truck desired.

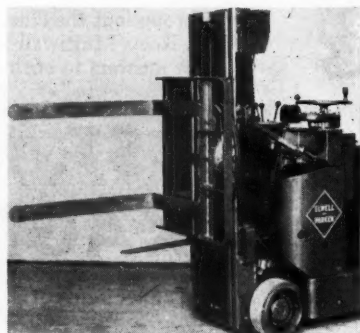
This assumes that the storage areas along the aisle are not overloaded. Two or more trucks could pass one another over this area in a given bay provided their combined weight is not greater than 16,600 lbs. Particular attention should be paid to this factor in front of elevators.

Further studies may be required for other types of floors—for example wooden floors where only a few boards may receive the full weight of the truck. A

more complete report may be obtained from R. F. Miller, Yale & Towne, Philadelphia, Pa.

Two-Way Fork Attachment For Handling Barrels

A three-prong fork to be used with a rotating head on a power truck's lifting mechanism is now built by the Elwell-Parker Electric Co., Cleveland, O., as standard auxiliary equipment for up-



ending and transporting heavily loaded steel barrels. It is useful for similar handling of many other objects, which must be reversed from a horizontal to a vertical position.

When a barrel is standing upright the short, single fork is pushed under it. The truck's upright column is tilted backward slightly and the rotating head inclines the barrel against the long, double fork, in which position it is transported.

When the barrel thus carried is to be put down horizontally the rotating head revolves the double fork with its load to the lower horizontal position, and the tines are then withdrawn.

The operation, controlled entirely by the truck driver, is reversed when the position of the object is to be changed from horizontal to vertical. Truck's lifting mechanism also enables operator to stack loads in either position up to a fork height of 112 inches.

The single fork is 18 inches long; the double fork 42 inches long. They are chisel-pointed. The single fork is detachable, and insertable at either side of the fork supporting plate. The double fork is adjustable out to 42 inches outside spread of the tines. Load capacity is 3000 pounds.

Multiwall Bags Coated With Polyethylene

St. Regis Paper Co., working in conjunction with resin suppliers, has developed a new process for coating kraft papers with synthetic resins, most notably polyethylene, which promises to open new



HEAVY DUTY MULTI-WALL

SHIPPING SACKS

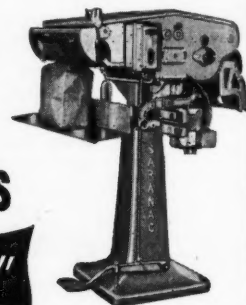
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SARANAC Bag Sealing Machines are designed to rapidly and economically close the tops of filled bags. Paper bags, bags with liners, glassine bags are quickly, securely sealed on the SARANAC. The same machine may be used to close the bottoms of empty bag tubes. A single pass through the SARANAC Bag Sealer results in a stout, sift-proof, almost hermetically sealed closure. One operator can seal as many as 75 bags per minute. Seals bags up to 10" in width. Write for free illustrated Bulletin and ask about the SARANAC Proposition.

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will show you how quality control eliminates customer complaints!

SHIPPERS of more than 300 different products find Union Multiwall Bags reduce customer complaints and losses in shipping and handling. They are custom-designed with reserve strength for hard knocks.

Continuous testing in Union laboratories leaves nothing to chance. Bag paper is tortured and torn, burst and frayed. Loaded bags are dropped and tumbled and scuffed to discover any weak points, any need for strengthening.

Union Quality Control checks and rechecks every step in the making from timber to finished bag.

This constant checking and testing is a safeguard for every order of Union Multiwall Bags. So when your Union Multiwall representative calls on you, tell him the requirements of your product, its shipping and handling. You can be sure your delivered bags will live up to specifications.

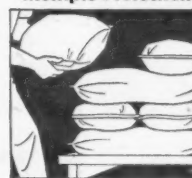
Even if you are now using multiwall bags, your Union representative can give you new ideas on bag construction, packaging and handling that will save you money. So welcome him when he calls!



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and important markets for the use of the multiwall bag. The coating gives improved protection from moisture and grease, and strengthens the paper.

The benefits to be obtained from the use of resin coated piles for multiwall paper bags have long been recognized, but heretofore the high cost of the application has proved a barrier to the broad expansion of this type of package. With its new coating operation in production, St. Regis can provide, on an economic basis, a multiwall bag containing a sheet of kraft paper coated with polyethylene for many heretofore unpackable or hard to pack materials.

Multiwall bags containing polyethylene coatings, in commercial use for over a year, have been tested in packaging calcium chloride and synthetic resins as well as food products. In addition to the advantages listed above, polyethylene is chemically inert, odorless, and tasteless. These properties are expected to recommend the new bags for other chemical applications.

Bag Plant Hits Stride

Bemis Bro. Bag Co.'s multiwall bag plant in Houston has reached full production and is capable of supplying all types of multiwall paper shipping sacks in the Texas area. This plant, acquired last year, has been in partial operation for several months. New machinery was installed during this period.

Western Packaging Exposition

Of particular interest to the chemical industry will be the Western Packaging Exposition to be held in the Civic Auditorium, San Francisco, Calif., August 10-12. Those on the West Coast who have been unable to participate in other expositions held in the East, will have an opportunity to learn of new developments in packaging and materials handling, the features of the exposition.

New Resin Carrier Allows Fast, "Hot" Delivery

Plaskon Division, Libbey-Owens-Ford Glass Co. is now shipping liquid coating resins in a new carrier which maintains them at the desired temperature until delivery to paint and varnish manufacturers. The trailer has a capacity for 4000 gallons of liquid resins in its three separate compartments, which are large enough to permit entry for cleaning, and are sealed by double-type domes similar to those used on fluid milk tankers to eliminate dust and dirt.

A self-contained pump, driven by a four-cylinder gasoline engine, unloads all compartments in less than 45 minutes. Speedy unloading in all-temperature weather is further facilitated by the tank's three inches of Fiberglas insulation and steam heating coils that maintain resins

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Continental makes a wide and complete assortment of cans for everything from pills to powders. If your packaging problem is one of size, shape, type of closure, special protection or merchandising appeal, chances are we have just the container you need.



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at desired viscosity. The resin temperature is controlled from the time a shipment leaves the Plaskon plant until it is delivered to a customer.

Safety features of the trailer are in strict compliance with Interstate Commerce Commission regulations. Overall length of the carrier is 45 feet; it stands 9 feet high; and when fully loaded weighs 36,585 pounds.

Favorable Outlook for Containers and Packaging

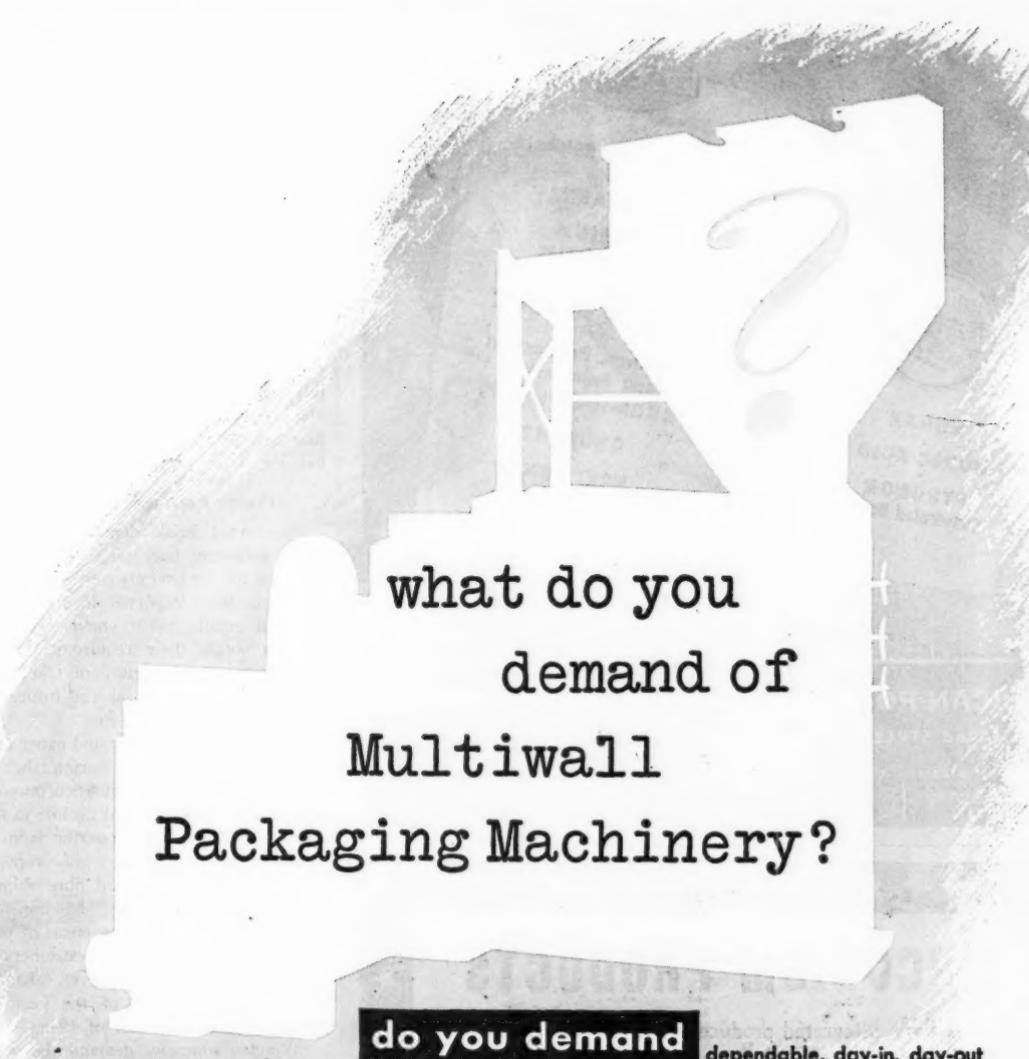
The outlook for containers and packaging, particularly as it applies to containers used in the chemical industry, is good, according to the quarterly Containers and Packaging Industry Report issued for June 1949 by the Office of Domestic Commerce, Washington, D. C.

The following excerpts of certain parts of this summary give a fairly clear picture of container and packaging conditions:

"Containers and packaging materials of all types are in readier supply than at any time in the last decade. From a procurement viewpoint the outlook is very favorable. From a production viewpoint the outlook ranges from good to uncertain depending upon the area of the country and the type of container manufactured. More and more producers are beginning to realize that the abnormal demand created by the pent-up and starved domestic market at the close of the last war could not be sustained indefinitely and that there are certain adjustments that must be made. It is expected that present container demand will be maintained throughout the summer and early fall. Demand for some types such as food packages will increase. Thereafter and through the year to winter it appears there will be some further adjustments necessary. The long term favorable growth prospect of the container industry, however, remains undiminished.

"In substance it appears that the year 1949 will see the national economy return to a state where container seasonal ups and downs can be anticipated with reasonable certainty and industry can plan accordingly. Trends in consumer preference from one type of container to another will be true trends and not distorted by shortages and other things which have made it advisable to use interchangeable or substitute packaging. This, of course, may involve some shaking out of the weaker lines, some further cutting back of production of some types of containers, but this has been foreseen as inevitable in the natural growth and progress of the industry.

"Metal can shipments, following what appeared to be, except for a few instances, a general trend throughout the container and packaging field, suffered a 9 percent decline for the first 2 months of 1949 compared with the same period of 1948, but with the food pack ahead should do



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operation at consistent high production rates?

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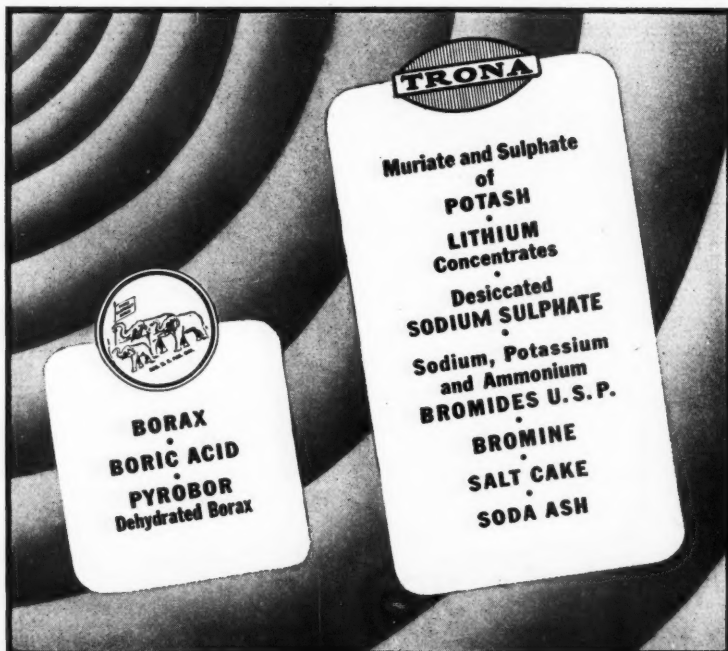
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better the balance of the summer. Preliminary data on steel drum and pail shipments during the first quarter 1949 indicated that the general leveling off trend reported in the February issue of "Containers and Packaging" has accelerated. Demand for heavier-type liquified petroleum cylinders and tanks was down in the first quarter, although demand for the small light-weight cylinders is still brisk. Collapsible tube shipments appeared to also be among the few containers not experiencing a decline during the first quarter 1949. It is believed, however, that the drop in price of lead and other raw materials used in the production of tubes probably brought about this change during the first quarter, and that demand during the balance of the year will level off.

Plastic Packages in Demand

"Continued brisk demand for plastic and transparent packaging materials was reported for the first quarter of 1949. Raw materials were reported in increasingly plentiful supply, with converters better able to obtain their requirements. Both producers and converters of transparent films are optimistic over the future outlook.

"The demand for paper and paper board containers of all types during the first quarter indicates that current output is adequate. A fairly general decline in shipments during the first quarter from the same period a year ago was reported, with corrugated and solid fibre shipping containers, for example, showing a 10 per cent decrease. The consensus of paper and paperboard containers, consumers and producers, indicates, however, that demand for the balance of the year will closely approximate that of 1948.

"Wooden container demand showed no improvement during the first 3 months of 1949 except in the Florida area. Particularly hard hit have been the tight cooperage and nailed wood box industries, while practically all categories have experienced some decline in output. Consequently, the outlook for wooden containers is generally reported as being only fair.

"Demand for textile containers, including both burlap and cotton bags, was still down during the first quarter. Consumers of bags are reported to be reducing inventories and will probably continue to make new purchases on a more or less spot basis.

"In summary, the short term outlook for the balance of the summer for container and packaging materials is generally good, with the possibility that during the last quarter of the year most categories will have to undergo some further adjustments, although many of these are expected to be of a slight nature. Regardless of the adjustments that will occur during 1949 there is no change in the favorable long term growth prospects in the container and packaging field."

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How many sales in a square yard?

It all depends on how well your package is designed to use the space—be it floor, shelf, or counter.

Remember, cans are compact. They stack easily into eye-catching displays. They encourage impulse buying.

It's evident, therefore, that one of the most profitable ways of putting a square yard of store space to work for the retailer (*and for you*) is to pack your product in metal containers.



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of quality containers. Look for it!*

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3. Cans are light—mean lower shipping costs.
4. Cans are tamper-proof.
5. Cans are easy to open and dispose of.

PLANT OPERATIONS NOTEBOOK

Compressed Gases

Safe handling of compressed gases is discussed in Pamphlet P-1, a 15-page brochure published by the Compressed Gas Association, Inc., 11 W. 42nd St., New York 18, N. Y. The introductory section covers applicable regulations, gen-

eral rules for cylinders, and general rules for tank cars. Separate sections discuss specific handling practices for the more common compressed gases. The pamphlets are 25¢ each up to ten, 20¢ each for 11 to 100 copies, and 15¢ for larger quantities.

NOMOGRAPH OF THE MONTH

Edited by DALE S. DAVIS

Nomographs for Chemical Kinetics—IV

by MELVIN NORD

Wayne University,
Detroit, Mich.

Constant-Volume Reversible Batch Reactions with a Single Reactant and a Single Product.

IN this case, the net reaction rate in a forward direction is given by the equation

$$(A \rightleftharpoons R): \frac{-d\epsilon_A}{d\theta} = kC_A - k'C_R \quad (39)$$

where k is the specific reaction rate constant for the forward reaction ($A \rightarrow R$) and k' is the specific reaction rate constant for the reverse reaction ($R \rightarrow A$). When the rate is zero, equilibrium is reached, and therefore

$$\frac{k}{k'} = \left(\frac{C_R}{C_A} \right)_{\text{equil.}} = K \quad (40)$$

where K is the equilibrium constant of the reaction. In order to make kinetics calculations for reversible reactions, it is necessary to know the value of K . This value can be determined for any reaction, in general, from the law of mass action, as

$$K = \left(\frac{C_R^{\nu_R} C_{\text{products}}^{\nu_{\text{products}}}}{C_A^{\nu_A} C_{\text{reactants}}^{\nu_{\text{reactants}}}} \right)_{\text{equil.}} \quad (41)$$

where the equilibrium concentrations of products, raised to a power equal to their coefficient in the reaction Equation 1, appear in the numerator of Equation 41, whereas the reactants appear in the denominator. It is, of course, necessary to determine one set of equilibrium concentrations in order to evaluate K . It is safer to determine K from several different sets of starting concentrations, and it is a very good idea to approach equilibrium from opposite directions to make sure that equilibrium has actually been established.

If Equation 40 is substituted in Equa-

tion 39, and the following substitutions are also made,

$$\left. \begin{aligned} C_A &= C_{A0} - x \\ C_R &= C_{R0} + x \end{aligned} \right\} \quad (42)$$

where x is the decrease in molal concentration of component A ,

$$\frac{dx}{d\theta} = \frac{k}{K} \left[(KC_{A0} - C_{R0}) - (K+1)x \right] \quad (43)$$

Since ϵ , the fractional conversion, is given by

$$\epsilon = \frac{x}{C_{A0}} \quad (44)$$

Equation 43 can be written as

$$\frac{d\epsilon}{d\theta} = \frac{k}{K} \left[\left(K - \frac{C_{R0}}{C_{A0}} \right) - (K+1)\epsilon \right] \quad (45)$$

On integration, Equation 45 becomes

$$\theta = \frac{2.303 K}{k(K+1)} \log \left[\frac{1}{1 - \left(\frac{K - \frac{C_{R0}}{C_{A0}}}{K - \frac{C_{R0}}{C_{A0}}} \right)} \right] \quad (46)$$

A nomograph based on Equation 46 can be constructed, but it is simpler to use Figure 1² (reproduced here) with the following changes: In place of ϵ in Figure 1, use ϵ' ; in place of k in Figure 1, use k'' , where

$$\left. \begin{aligned} \epsilon' &= \left(\frac{K+1}{K - \frac{C_{R0}}{C_{A0}}} \right) \epsilon \\ k'' &= k \left(\frac{K+1}{K} \right) \end{aligned} \right\} \quad (47)$$

This situation is evident from a comparison of Equations 12 and 46. When the reaction is irreversible, so that $K = \infty$, Equation 47 reduces to $\epsilon' = \epsilon$, and $k'' = k$, as it obviously must.

Other Constant Volume Reversible Batch Reactions

As an example, consider the reaction:



In this case

$$-\frac{dC_A}{d\theta} = \left(kC_A C_B - \frac{C_R^2}{K} \right) \quad (49)$$

On substitution of

$$\left. \begin{aligned} C_A &= C_{A0} - x \\ C_B &= C_{B0} - x \\ C_R &= C_{R0} + 2x \end{aligned} \right\} \quad (50)$$

there results

$$-\frac{dC_A}{d\theta} = \frac{k}{K} \left[K(C_{A0} - x)(C_{B0} - x) - (C_{R0} + 2x)^2 \right] \quad (51)$$

or

$$-\frac{dx}{d\theta} = \frac{k}{K} \left[x^2(K-4) + x(-KC_{B0} - KC_{A0} - 4C_{R0}) + (KC_{A0}C_{B0} - C_{R0}^2) \right] \quad (52)$$

On integration,

$$\theta = \frac{2.303 K}{kq} \log \left[\frac{1 + \left(\frac{2c}{b-q} \right) x}{1 + \left(\frac{2c}{b+q} \right) x} \right] \quad (53)$$

where

$$\left. \begin{aligned} a &= KC_{A0}C_{B0} - C_{R0}^2 \\ b &= -KC_{A0} - KC_{B0} - 4C_{R0} \\ c &= K - 4 \end{aligned} \right\} \quad (54)$$

$$q = \sqrt{b^2 - 4ac}$$

As a matter of fact, all the other reversible reactions (except those containing third-order reactions) satisfy Equation 53, with different values of the constants a , b and c . Appropriate values of the constants for the different types of reactions 1 follow:

$$(A \rightleftharpoons 2R): \left. \begin{aligned} a &= KC_{A0} - C_{R0}^2 \\ b &= -K - 4C_{R0} \\ c &= -4 \end{aligned} \right\} \quad (55)$$

$$(A \rightleftharpoons R + S): \left. \begin{aligned} a &= KC_{A0} - C_{R0}C_{S0} \\ b &= -K - C_{R0} - C_{S0} \\ c &= -1 \end{aligned} \right\} \quad (56)$$

$$(A + B \rightleftharpoons R): \left. \begin{aligned} a &= KC_{A0}C_{B0} - C_{R0} \\ b &= -KC_{A0} - KC_{B0} - 1 \\ c &= K \end{aligned} \right\} \quad (57)$$

$$(2A \rightleftharpoons R): \left. \begin{aligned} a &= KC_{A0}^2 - C_{R0} \\ b &= -2KC_{A0} - \frac{1}{2} \\ c &= K \end{aligned} \right\} \quad (58)$$

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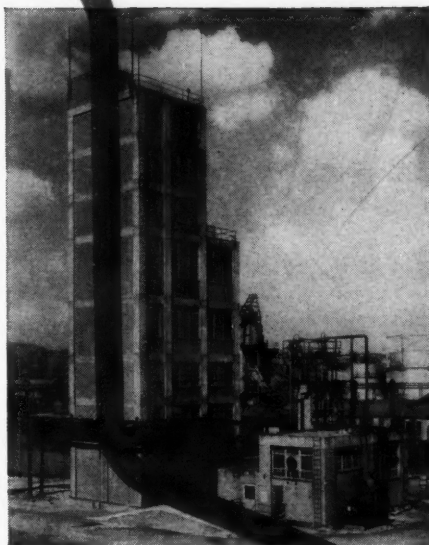
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$$\begin{aligned} (A+B \rightleftharpoons R+S): \\ a = KC_{A0}C_{B0} - C_{R0}C_{S0} \\ b = -KC_{A0} - KC_{B0} - C_{R0} - C_{S0} \\ c = K - 1 \end{aligned} \quad (59)$$

$$\begin{aligned} (2A \rightleftharpoons R+S): \\ a = KC_{A0}^2 - C_{R0}C_{S0} \\ b = -2KC_{A0} - C_{R0} - C_{S0} \\ c = K - \frac{1}{2} \end{aligned} \quad (60)$$

$$\begin{aligned} (A+B \rightleftharpoons 2R): \\ a = KC_{A0}C_{B0} - C_{R0}^2 \\ b = -KC_{A0} - KC_{B0} - 4C_{R0} \\ c = K - 4 \end{aligned} \quad (61)$$

$$\begin{aligned} (2A \rightleftharpoons 2R): \\ a = KC_{A0}^2 - C_{R0}^2 \\ b = -2KC_{A0} - 2C_{R0} \\ c = K - 1 \end{aligned} \quad (62)$$

In each case,

$$q = t \sqrt{b^2 - 4ac} \quad (63)$$

The best way to use Equation 53 is also in conjunction with Figure 1 with the following changes: In place of ϵ in Figure 1, use ϵ''' ; in place of k in Figure 1, use k''' , where

$$k''' = \frac{kq}{K} \quad (64)$$

$$\epsilon''' = 1 - \frac{1 + \left(\frac{2c}{b+q} \right) x}{1 + \left(\frac{2c}{b-q} \right) x} \quad (65)$$

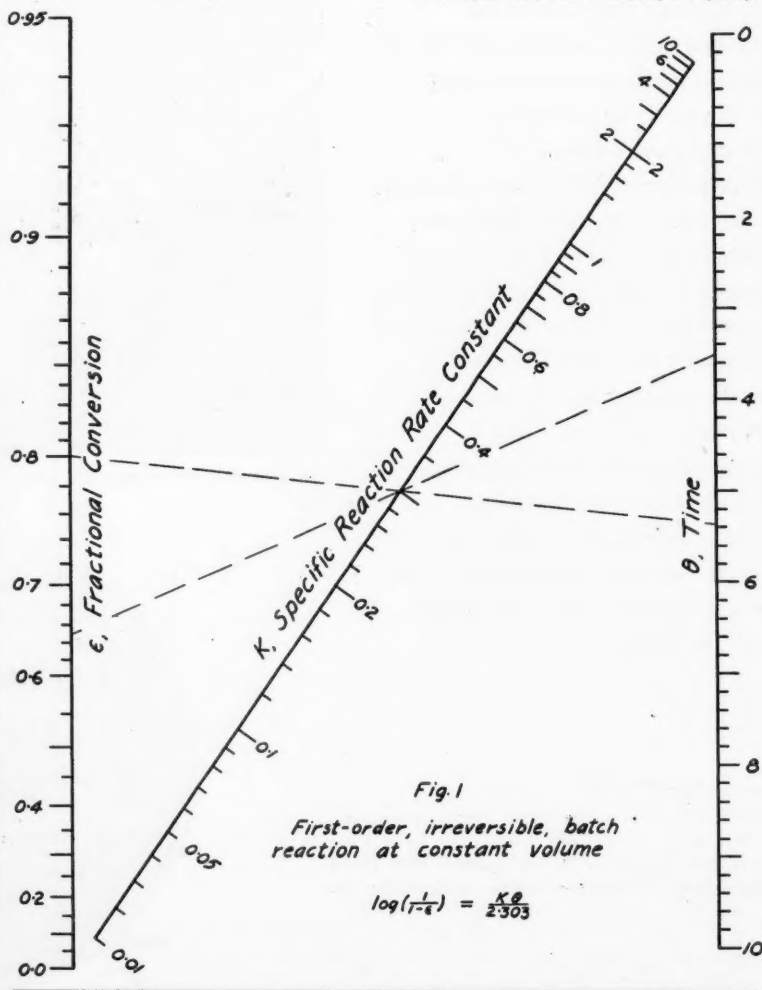
Equations for reversible reactions of the third order are not integrable; it is necessary to use the differential equations. These cases are best handled by graphical plotting, rather than by the use of nomographs.

Nomenclature

- C_A —molal concentration of component A at time θ
- C_{A0} —initial molal concentration of component A
- θ —time
- k —specific reaction rate constant
- K —equilibrium constant
- x —decrease in concentration of component A
- ϵ —fractional conversion

Literature Cited

1. Hougen, O. A., and Watson, K. M., "Chemical Process Principles", Part III, p. 825, New York, John Wiley and Sons, Inc., 1947.
2. Nord, Melvin, Chem. Ind., 63, 666 (1948).





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Essential Oils

THE ESSENTIAL OILS (VOLS. I AND II)
by Ernest Guenther and associates. Van
Nostrand Co., New York, 427 and 852
pp., Price \$6.00 and \$8.00, 1949. Re-
viewed by M. T. Bogert, Senior Scien-
tific Consultant and Adviser, Evans
Research and Development Corporation,
New York, N. Y.

AT LAST this urgently needed and
eagerly awaited great reference work by
Dr. Guenther and his collaborators is
beginning to come from the presses, and
Vols. I and II are now available.

Of these two, Vol. I, Chapter I (by
Dr. George Urdang, Director, American
Institute of the History of Pharmacy,
Madison, Wis.), deals with the origin
and development of the essential oil in-
dustry; Chapter II (by Dr. A. J. Haagen-
Smit, Professor of Bio-Organic Chemis-
try, California Institute of Technology,
Pasadena, California), with the chemis-
try and function of essential oils in
plant life; Chapter III (by Dr. Guenther)
with the production of essential oils,
methods of distillation, enfleurage, ma-
ceration, and extraction with volatile sol-
vents; and Chapter IV (by Edward E.
Langenau, Director, Analytical Labora-
tories, Fritzsche Bros., Inc., N. Y.), with
the examination and analysis of essential
oils, synthetics and isolates.

The first 768 pages of Vol. II (by Drs.
Guenther, and D. Althausen, Manager,
Clifton Factory, Fritzsche Bros., Inc.,
Clifton, N. J.), are devoted to a discus-
sion of the constituents of essential oils,
arranged in chemical sequence, beginning
with the hydrocarbons.

This is followed by a chapter (by Dr.
Frances S. Sterrett, Research Chemist,
Fritzsche Bros., Inc.), on the preparation
of such derivatives, taken up in similar
order, and may be considered as a sup-
plement to Part VII of Chapter 4 in Vol.
I ("A Procedure for the Investigation of
the Chemical Constituents of an Essen-
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dividual essential oils, their separation,
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of production, and separate bibliographies.

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marking monumental encyclopedia on *Die
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motest corners of the world, to familiarize
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which is really authoritative, for it records
information which the author has gathered
personally. It is therefore far removed
from being just another "scissors" book.

In the second place, Dr. Guenther is
an experienced investigator and technician,
and the physical and chemical data re-
corded have in most cases been verified
and checked by him personally, or by
members of his staff. In this he has had
the assistance of the extensive scientific
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PLASTICS IN ENGINEERING, by John Delmonte,
3rd ed., \$10.00, Penton Publ. Co., Cleveland.
Discussion of properties and applications of all
types of plastic materials, 656 pp.

PLASKON RESINOTES is a new newsletter ad-
dressed to users of synthetic resins in the pro-
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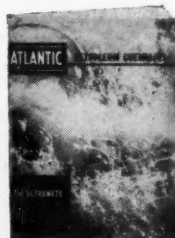
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Tennessee Eastman Corp.'s 73-p. catalog gives specifications and properties of the chemicals available from the company, including aldehydes, acids, anhydrides, esters and alcohols.

Glycols.....B729
8-p. booklet describes use and properties of 8 new glycols. Form 6719, Carbide and Carbon Chemicals Corp.

Zinc.....B730*
"The Zinc Industry," a descriptive outline of zinc from mine to market, dealing with production and consumption. 64 pp., American Zinc Institute.

Polymers.....B731
Leaflet describes how compounds, blends and modifications of polymers are processed for use as printing gums, finishes, adhesives and coatings. Polymer Industries, Inc.

Silvacon.....B732
4-p. bulletin describes the application of fractionated bark products to the rubber industry. Weyerhaeuser Timber Co.

Coating Material.....B733
16-p. booklet on Dow Latex 512K, coating material for improving clay coated papers, deals with its use as a pigment binder, in blends with other adhesives, and in coating colors. Its properties are also included. The Dow Chemical Co.

Chemicals.....B734
Price list of fine organic chemicals. The Matheson Co.

Gases.....B735
Price list of compressed gases and gas regulators. The Matheson Co.

Herbicide.....B736
Preliminary report on Monsanto Chemical Co.'s 2, 4, 5-T herbicide for brush and woody plants, includes physical, chemical and formulation data and a synopsis of experimental results.

Cyanuric Chloride.....B737
30-pg. bulletin describes physical and chemical characteristics and uses of cyanuric chloride, now in pilot-plant production. American Cyanamid Co.

Fatty Acids.....B738
Comparison chart shows constants and compositions of 23 vegetable oils, plus all commercially available animal and marine fats and oils. Technical bulletin 77, Archer-Daniels-Midland Co.

Mono-tert-butyl-meta-cresol.....B739
24-p. bulletin describes physical and chemical properties, uses and chemical reactions of MBMC, a liquid alkylated phenol. Koppers Co.

Grotonic Acid.....B740
Bulletin gives specifications, properties, uses in molding polymers, protective films, plasticizers and other uses. Tennessee Eastman Corp.

Chemicals, Bulk.....B741
48-p. catalog lists 234 heavy and fine chemicals and 349 botanicals, gums, oils and waxes, and the size and kind of shipping containers and principal uses of each. McKesson and Robbins, Inc.

Plasticizers and Chemicals.....B742
Ohio-Apex products described in 65-p. booklet. Test data, and tables on physical properties, resin solubility, viscosity and vapor pressure included.

Insecticide.....B743
Technical bulletin on Toxaphene, including results of field tests. John Powell & Co.

Soya Products.....B744
"Cracking the Soybean" discusses the history, and industrial applications of soybeans. 16 pp., Archer-Daniels-Midland.

Chemicals, Industrial.....B745
List of industrial chemicals available from Harshaw Chemical Co.

Oil Upgrader.....B746
Description of "Dryene," synthetic organic developed for improving natural drying oils. 4 pp., Carbide and Carbon Chemicals Corp.

Chemicals.....B747
20-p. booklet describes briefly chemicals available from Philipp Brothers Chemicals, Inc.

Chemicals.....B748
Price list of Fine Organics, Inc., products.

Resin, Acrylic.....B749
32-p. booklet containing general information about "Lucite" acrylic resin cast sheeting and a chart listing its properties. E. I. du Pont de Nemours & Co.

Insecticide.....B750
Technical Supplement No. 2 (Revised, June, 1949) on chlordane emulsions. Julius Hyman & Co.

Equipment

Load Measuring Beam.....J350
2-p. illustrated bulletin, No. 274, describes application of SR-4 Load Beams in process and machine control and for general force measurement. Loads are measured by strain gages. Baldwin Locomotive Works, Testing Equipment Dept.

Corrosion Inhibition.....J351
"Corrosion Inhibition with Chromate" is the title of a 16-p. pamphlet reprinting four articles. Mutual Chemical Co. of America.

Counters.....J352
High-speed presettable counters for pieces or packages are described in a 3-p. folder with prices and accessories. Airlectron, Inc.

Agitator.....J353
A heavy-duty "Mixco" turbine agitator is described in a bulletin available from Mixing Equipment Co.

Fume Washers.....J354
4-p. bulletin describes equipment for scrubbing and absorbing corrosive fumes. Maurice A. Knight Co.

Lubrication.....J355
"Studies in Centralized Lubrication, 1949," titles an 8-p. booklet describing the Farval Corp.'s equipment lubrication system.

Welding.....J356
32-p. pocket-size combination handbook and catalog of welding supplies and information. All-State Welding Alloys Co., Inc.

Transformer, Butyl-Molded.....J357
8-p. bulletin, GEA-5274, describes first of a line of instrument current transformers insulated by high-pressure injection of butyl rubber. General Electric Co.

Pump.....J358
5-gal. air-operated pump, designed for applying caulking compounds, putty, adhesives, sealers, etc. is described in 2-p. bulletin. Gray Co., Inc.

Condensate Return System.....J359
Savings in textile drying are claimed for the Cochran C-B System, described in Bulletin 3250. Cochran Corp.

Car Shaker.....J360
Shaker for unloading granular materials from drop-bottom gondola cars is described in 6-p. folder, 07B7221. Allis-Chalmers Mfg. Co.

Sulfuric Acid Dilution.....J361
Equipment to produce cool dilute sulfuric acid from commercial-strength acid and water is described in Catalog Section M-8806A. National Carbon Co., Inc.

Control, Photoelectric.....J362
A delayed-action photoelectric control is described in Bulletin PA 494. Photoswitch, Inc.

Hose, Hydraulic Control.....J363
Hydraulic control hose for 300-5,000 psi working pressure is described in a catalog section available from the B. F. Goodrich Co.

Plastic Fabrication.....J364
Various machines for the fabrication of sheet plastic are described and illustrated in a 6-p. folder. Taber Instrument Corp.

Wire, Metal Filter Cloth.....J365*
Wire cloth of 10-120 mesh and filter cloth of 40-700 mesh in various weaves and materials are available in two sample kits. The user should specify which kit he desires. Michigan Wire Cloth Co.

Motor, Synchronous.....J366
High-speed synchronous motors for direct, belt or gear drive are described in 4-p. bulletin, PB 5600-1. Elliott Co.

Power Feeder Line.....J367
4-p. circular, No. 152, describes the LVD (Low Voltage Drop) Flex-A-Power, a prefabricated feeder line and riser for current transmission. Trumbull Electric Mfg. Co.

Hose, Water.....J368
Specs, descriptions and illustrations of various types and grades of industrial water hose are contained in a catalog section published by the B. F. Goodrich Co.

Generators.....J369
Bulletin 05B6031B, 8 pp., describes alternating-current, high-speed, coupled-type synchronous generators and related equipment. Allis-Chalmers Mfg. Co.

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B729	B739	B749	J358	J368	J378	J388	J398	J408	J418
B730*	B740	B750	J359	J369	J379	J389	J399	J409	J419
B731	B741	J350	J360	J370	J380	J390	J400	J410	J420
B732	B742	J351	J361	J371	J381	J391	J401	J411	J421
B733	B743	J352	J362	J372	J382	J392	J402	J412	J422
B734	B744	J353	J363	J373	J383	J393	J403	J413	
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Hubs, Bushings, Adapters.....J370

Specs, descriptions and drawings of hubs, bushings and adapters. Bulletin A-420, 8 pp. Dodge Mfg. Corp.

Motors, Synchronous.....J371

Operating advantages and construction features of bracket bearing synchronous motors of 30-1,000 HP. Bulletin 05B6112A, 16 pp. Allis-Chalmers Mfg. Co.

Transformers, Distribution.....J372

4-p. bulletin, No. 49-ACO, describes a series of air-cooled, all-purpose distribution transformers manufactured by the Marcus Transformer Co.

Mills, Wet Grinding.....J373

Bulletin AH-389, 16 pp., discusses an extensive line of wet grinding mills and related equipment. Harding Co.

Corrosion Protection.....J374

"Corrosion Protection of Steam and Condensate Return Systems" is the title of a 4-p. folder available from the Bird-Archer Co.

Agitators.....J375

4-p. bulletin describing the design, construction features, and application of side entering agitators. Industrial Process Engineers.

Crushers, Heavy-Duty.....J376

American Pulverizer Co. bulletin gives capacities, ratings and dimensions of its line of heavy duty crushers.

Grinding Plastics.....J377

"Grinding Plastic Scrap and Fillers Profitably" describes the "KC" rotary knife chopper. American Pulverizer Co.

Rotameter.....J378

Technical bulletin No. 6 describes full-view rotameter with safety shielding. 4 pp., Brooks Rotameter Co.

Lift Trucks.....J379

8-p. bulletin No. 4861 describes 3 battery powered units which lift and travel electrically. Barrett-Cravens Co.

Wire, Sprawled.....J380

7-p. booklet gives application instructions for sprawled wire for standard metallizing guns. Wall Colmonoy Corp.

Scale, Crane.....J381

Capacities and prices of 3 hydraulic crane scales are described in 4-p. bulletin of the A. H. Emery Co.

Iron-Silicon Alloys.....J382

Data on Duriron and Durichlor, corrosion-resisting, high-silicon irons is given in bulletin 113, 11 pp., The Duriron Co.

Pipe Saw.....J383

4-p. booklet describes use of portable pipe saw. E. H. Wachs Co.

Building Materials.....J384

Folder on how to stop leaks in all types of masonry construction. Stonhard Co.

Welding Accessories.....J385

15-p. catalog describes accessories for both oxy-acetylene and electric arc welding. Air Reduction Co.

Valve.....J386

Bulletin 530 covers specifications and applications of liquid-level control valve. 12 pp., The Parker Appliance Co.

Brazing.....J387

Bulletin No. 46 describes brazing fixture operated by foot. 4 pp., Handy & Harman.

Chain, Conveyor.....J388

Dimensions, specifications, and prices of level-line conveyor chain are given in 12-p. booklet of Whitney Chain & Mfg. Co.

Valves.....J389

Technical bulletin CS 449 describes bin valves for controlling powdered materials. Ledeen Mfg. Co.

Insulating Materials, Fiberglass.....J390

36-p. booklet describing Fiberglass and Fiberglass-base materials for insulation of wire, cable and electrical equipment. Owens-Corning Fiberglass Corp.

Controls, Static Pressure.....J391

Specifications and description of explosion-proof, dust- and splash-proof static pressure controls. 4 pp., Coral Designs.

Switches.....J392

4-p. folder contains photographs and descriptions of fuse puller switches for residential panels. Folder TEC-311A, The Trumbull Electric Mfg. Co.

Fluxes.....J393

"Why and How to Use H-VW-M Fluxes for Hot Dip Galvanizing and Hot Tinning," titles bulletin F-100, The Hanson-Van Winkle-Munzing Co.

Baker, Winding.....J394

Description of portable motor winding baker for transformer, armature and other windings. 1 p., Mikella Infra-Red Co.

Furnaces, Electric.....J395

2-p. leaflet describes advantages and gives technical data on electric furnaces. Modern Electric Laboratory.

Tank Capacity-Size Calculator.....J396

A slide rule-type of calculator to show storage capacity in gallons and cubic feet in tanks from 10 to 100 feet in height and from 20 to 120 feet in diameter. Also gives weights of steel plate. Hammond Iron Works.

Filter.....J397

4-p. booklet describes filter for removal of dirt, oil and moisture from compressed air. Jas. A. Murphy & Co.

Strain Gage.....J398

4-p. bulletin on the uses of SR-4 bonded resistance wire strain gages, and the types now available. Bulletin No. 179, The Baldwin Locomotive Works.

Pumps.....J399

Description of Allis-Chalmers line of Type CW solids pumps. 8 pp., Bulletin 08B6381C.

O-Rings.....J400

Bulletin 934, The Parker Appliance Co., covers application and physical properties of 4 fuel-resistant compound type O-rings for aircraft use in sealing fuel systems.

Heaters, Electric.....J401

5 booklets from the General Electric Co. describing electric heaters for pipelines, soft metals, process air, liquids, and surfaces. Nos. GET-1739 through GET-1743.

Pump Control.....J402

37-p. booklet gives data on precision control for pumps for domestic water systems, wells, compressors and cellar drain. Cutler-Hammer.

Hose, Acid.....J403

Catalog section 3440, The B. F. Goodrich Co., recommends uses for standard acid hose for discharge. 4 pp.

Boxes.....J404

Revised edition of "How to Prepack in Corrugated Boxes," analyses problems in connection with prepacking. 28 pp., The Hinde & Dauch Paper Co.

Line Counter.....J405

4-p. bulletin gives uses for micro-line counter for checking fabrics, fine screens, etc. Micro-Lite Co., Inc.

Film Applicator.....J406

Leaflet describing operation and use of film applicator. Baker Castor Oil Co.

Thermocouple.....J407

Bulletin 805, Farrand Optical Co., describes fast thermocouple of high sensitivity.

Pumps.....J408

Specifications and uses of small immersion pumps. 1 p., Samuel S. Gelber Co.

Oil Burner Safeguard.....J409

Bulletin No. CH-4752 gives specifications and description of Fireye System FF-1 for the protection of commercial-size oil burners from flame failure. Combustion Control Corp.

Feeders for Liquids.....J410

4-p. bulletin describes operation and dimensions of precision feeders for liquids. Bulletin No. 60-B1A, Omega Machine Co.

Pallets.....J411

Catalog describing various types of wooden pallets made by National Pallet Corp. 16 pp.

Smoke Abatement.....J412

4-p. bulletin describing over-fire air jets for smoke abatement and how they work. Pilbrico Jointless Firebrick Co.

Dryers.....J413

Catalog D-27, C. M. Kemp Mfg. Co., discusses desiccant-bed drying of air, gases and liquids. 32 pp.

Motors.....J414

Bulletin 51B6210B, Allis-Chalmers Mfg. Co., describes design and construction of "Safety-Circle" drip-proof and splash-proof motors. 8 pp.

Conveyor.....J415

Folder describing interfloor power belt conveyor. 4 pp., The Rapids-Standard Co.

Chlorine Gas Meter.....J416

4-p. bulletin describes features and operation of Model DVS Chlorinizer for metering chlorine gas. Builders-Providence, Inc.

Tools, Electric.....J417

Descriptions and specifications of Thor silver line portable electric tools, including drills and saws. 4 pp., Independent Pneumatic Tool Co.

Welding, Inert-Gas.....J418

Résumé of inert-gas, shielded-arc welding, including description of process, gases used, electrodes, control of gas flow, welding equipment and techniques in welding various metals. 16 pp., Air Reduction Sales Co.

Scale.....J419

Catalog page describing scale using the static pressure principle for cranes and hoists. Hydroway Scales, Inc.

Pyrometer Controller.....J420

2-p. bulletin on application, features, and scale ranges of Multi-Switch capacitrol indicating pyrometer controller. Bulletin MC-1, Wheelco Instruments Co.

Filter Cloth.....J421

4-p. bulletin describes Hastelloy wire filter cloth for screening processes in which corrosion is a problem. Table of resistance of Hastelloy alloys to corrosive media is included. John A. Roebbing's Sons Co.

Clamp, Laboratory.....J422

Description of method for construction of frames for secure mounting of experimental set-ups with a three-section clamp. 4 pp., Emil Greiner Co.

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Resins, varnishes, shellacs and other liquids play an important part in the manufacture of many General Electric products. The quality of these liquids must be high. And to make sure that shipments can be made with security from tampering Tri-Sure Closures* are used.

Many firms in the first rank of American industry have used Tri-Sure protection since the inception of the Tri-Sure Closure in 1932. And during those 17 years, hundreds of shipments of G-E chemicals have attested the efficiency of the Tri-Sure *flange*, *plug* and *seal*.

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TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA**

NEWS OF THE MONTH

New Construction

Hooker-Detrex, Inc., Niagara Falls, N. Y., will build a trichlorethylene plant in Ashtabula, Ohio, at a cost in excess of \$1.5 million. A 25-acre site has been acquired, construction is expected to start immediately, and the plant is scheduled to be in operation early in 1950.

The location is central with respect to the eastern market for trichlorethylene, and the necessary raw materials, calcium carbide and chlorine, are readily available. Chlorine will be supplied as a gas via pipe line from the new \$10 million sodium plant now under construction by National Distillers Chemical Corp. in Ashtabula. It is estimated that a sodium plant of that size would produce about 75 tons per day of chlorine. Since substantially all will be supplied to Hooker-Detrex, an estimated 40 million pounds of trichlorethylene will be added to the 200 million pounds a year estimated U. S. capacity for this material.

Hooker-Detrex, Inc., which is owned jointly by Hooker Electrochemical Co., Niagara Falls, N. Y., and Detrex Corp., Detroit, Mich., built and placed in operation in 1947 a trichlorethylene plant at Tacoma, Wash., to supply the west coast demand for the product, widely used as a metal cleaning and oil-extraction solvent. Operation of these subsidiary plants is under the supervision of the Hooker Electrochemical Co., and Detrex Corp. has contracted to market their entire output.

The Atomic Energy Commission has scheduled a \$19-million construction and improvement program at its Oak Ridge national laboratory. The laboratory expansion will involve construction in the next 2½ years of 205,000 sq. ft. of new buildings, renovation of 15 existing buildings, and improvements in roads and plant utilities. Principal new facility will be a 139,000 sq. ft. research building to house chemistry, technical and physical divisions and parts of the service division. This new program is in addition to the previously announced \$70-million expansion of the gaseous diffusion plant at Oak Ridge.

The Texas Gulf Sulphur Co. is having erected at Worland, Wyo., a gas treating plant to extract hydrogen sulphide from natural gas from wells operated by the Pure Oil Co. and a sulphur recovery plant to reduce the hydrogen sulphide to elemental sulphur (*CI, Feb., 1949, p. 210*). The Girdler Corp. is the general contractor supplying the engineering design and all equipment.

Girdler has let sub-contracts to C. F.

Braun & Co. for general erection and to the Foster Wheeler Corp. for the design and equipment of the sulphur recovery portion of the plant. Extraction of the natural gas will be by means of the Girbotol process developed by The Girdler Corp.

The Chemical Plants Division of Blaw-Knox Construction Co. has begun the erection of a new Permalite production plant at Linden, N. J., for Great Lakes Carbon Corp., New York. Permalite is a light-weight insulating aggregate used in plastering and concreting. The new plant will occupy a three-acre site and should be in production in the early part of this summer.

Johns-Manville Corp.'s new research center at Manville, N. J., was formally dedicated recently. Begun in 1945, the center is part of the company's \$60 million postwar expansion program.

The new project comprises in the main a product development building, a research and administration building, a mechanical building and an engineering building. The product development building consists of a two-story section housing research laboratories and a one-story section where 10 pilot plants will be used for experimental manufacture.

Pure Carbonic, Inc., has opened a new carbonic gas cylinder filling plant and "dry-ice" warehouse in Pittsburgh, Pa., at 1117 Metropolitan St.

Air Reduction Co., manufacturers of industrial gases and welding equipment, has opened a new oxygen plant in Flint, Michigan. The plant, built at a cost in excess of \$250,000, will produce more than four million cubic feet of oxygen per month. In addition to oxygen manufacture, this plant will also be an acetylene gas supply point and a store room for welding equipment and supplies.

The company also recently established a new warehouse point in Tulsa, Okla.

New laboratory facilities for chemical and physical research by the Kellex Corp. for the U. S. Atomic Energy Commission are now in operation at the Jersey City, N. J., plant of The M. W. Kellogg Co., parent company of Kellex. Constructed under a prime contract between the Kellogg Corp. and the U. S. Atomic Energy Commission, the research facilities will enable Kellogg scientists and engineers to develop and test on a laboratory scale certain chemical processes concerned with the Commission's nuclear reactor development program.



John H. Schaefer, elected president of the Industrial Research Institute. He is vice-president in charge of manufacturing, the Ethyl Corp.

Air Reduction Co. has opened a new acetylene plant in Acton, Mass. Built to serve the New England area, this plant has a rated capacity of 100,000 cubic feet of acetylene per day. It will operate on a three-shift, 24-hour day.

A new sludge disposal system that carries plant waste over a mile-long line to a settling basin has been put into operation at the Creighton, Pa., plant of the Pittsburgh Plate Glass Co. The process diverts the discharge of 300-400 tons of grinding abrasive which formerly poured into the Allegheny river daily.

Government Contracts

A contract to organize and operate a laboratory for basic research and development in rockets and jet propulsion has been signed with the Ordnance Department of the U. S. Army by Rohm & Haas Co., Philadelphia. The projects will be located at the Army's Redstone Arsenal near Huntsville, Ala., one of the large arsenals constructed during the last war.

A company spokesman said that the company is undertaking this project as a public service, with no intention of entering into the manufacture of propellants.

The U. S. Army Corps of Engineers has awarded a \$1,341,637 contract for a survey in 37 states and Alaska, to determine suitable general areas for the manufacture of synthetic liquid fuels, to the firm of Ford, Bacon and Davis, Inc., New York City. The current survey will follow the pattern developed by a sample survey made in portions of three states



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PROPERTIES OF PENTAPHEN:

Color	white (solid)
Solubility in 10% KOH	100%
Freezing Point	92°C. min.
Phenol Coefficient (Staph. Aureus)	50-55
Phenol Coefficient (E. Typhi)	40

*For specifications, prices and further information,
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PERHAPS WE CAN DO IT FOR YOU! . . .

Many an industry has gone along for years, calmly accepting the discomfort, inconvenience and, often times, high cost of its odor problems on the casual assumption that they were insoluble. Such conclusion is always unwise until the problem in question has had the expert attention of specialists skilled in the use and application of our amazingly versatile aromatics. So, don't neglect *your* problem if you have one; consult our experts and let us help you . . . in confidence . . . and without obligation.

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last year by Ford, Bacon and Davis under a \$114,000 contract let last June.

Among contracts recently let by Department of the Army to chemical companies was an award to Phillips Chemical Co., Bartlesville, Okla., for 20,000 tons of ammonium sulfate at \$592,100.



Charles P. Walker, Jr., named general sales manager, **Charles Pfizer & Co.** He joined Pfizer in 1948.

Foreign Developments

Sulphur Export Corp. is not planning or contemplating any agreements with Italian sulphur producers, according to company president Clarence A. Snider. Mr. Snider stated that there was no basis for the statement by Calogero Volpe, president of the Italian sulphur organization, in a recent interview by the Associated Press in Rome in which he indicated that an agreement was being awaited. In fact, Mr. Snider added, there has not even been any discussion looking toward any agreements.

In the same interview the belief was expressed by Mr. Volpe that the sulphur mines of Louisiana and Texas will near exhaustion in four or five years. In reply Mr. Snider pointed out that estimated life of reserves of sulphur is many times that stated by Mr. Volpe.

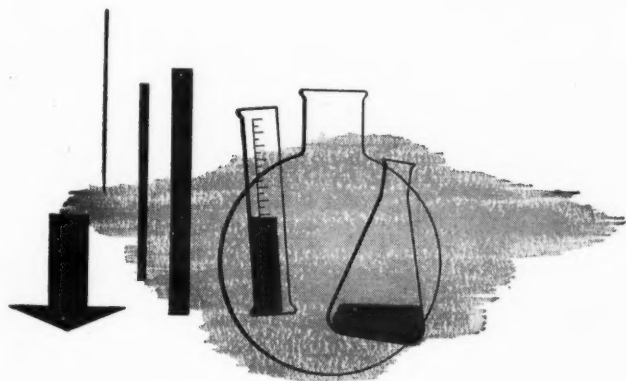
Plans for the breakup of the I. G. Farben chemical empire are underway, and one of its units will soon be offered for sale. The British, Americans and Germans are in agreement on establishing three major units, each one which will be self sufficient, from the diverse properties of the combine. The three have been selected in the American zone, and bids on one of them will soon be let.

Chemical Plants Division of Blaw-Knox Co. has received two foreign orders for the engineering and procurement of modern fat splitting plants. The "Gouda-Apollo Company" (N. V. Vereenigde Stearine Kaarsenfabrieken) of Gouda, Holland, placed a contract for a plant of

one of many **DOW** chemicals
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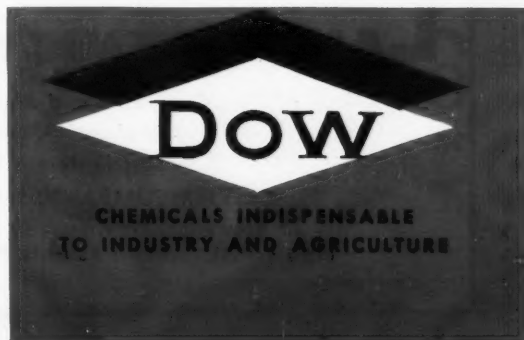
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p-Chlorophenol

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33 tons per day capacity. The source of the other award was not reported but involves a European buyer and calls for a plant with a daily production of 20 tons. Both of the plants will use the Colgate-Emery continuous, high pressure fat splitting process.

Ownership Changes

Monsanto Chemical Co. has become owner of all the shares of Merritt-Monsanto Corp., at Lockport, N. Y. Merritt-Monsanto, manufacturers of veneer and plywood equipment, previously had been a subsidiary partially owned by Monsanto, partially owned by Ericsson H. Merritt, of Lockport, who has served as president, and partially by other interests. The eastern manufacturing concern now becomes a wholly-owned subsidiary of Monsanto and John E. Gurvin, vice-president and general manager will replace Merritt as president.

Pittsburgh Plate Glass Co. through the Canadian Industrial Glass Co., Ltd., a newly organized, wholly-owned subsidiary, has purchased from Industrial Glass Co., Ltd., a window glass producing plant at St. Laurent, Quebec, Canada. Fifty thousand shares of Pittsburgh stock, equal to approximately \$1.5 million have been issued to Industrial Glass Co., Ltd., for land, buildings and equipment of the St. Laurent plant. At present the plant is closed for repairs to the glass melting tank and other equipment, but production will be resumed soon.

Patents for License

The Dow Chemical Co. has removed all royalty fees on the magnesium plating process it brought to commercial development a few months ago. The only stipulation of the new license arrangement, is that Dow be permitted free access to any process improvements which may be made by the licensee.

Celanese Corp. of America has placed upon the United States Patent Office Register of Patents Available for Licensing approximately 2400 patents covering methods and processes for the manufacture of textiles, plastics and chemicals.

General Topics

Building costs have dropped as much as 25 per cent in some sections of the country, according to a New York Engineering firm. This represents just about the extent of the water in these costs, and further squeezing is going to be a lot tougher. New York area figures have dropped 10 to 15 per cent but are expected to hit the 25 per cent mark later this year.

At the quarterly meeting of the New England Interstate Water Pollution Control Commission held in Providence recently, A. E. Marshall, vice-president.

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Nov. 1st to 5th incl. 1949
Hours: 12 noon—10 p.m. daily; 10 a.m.—6 p.m. Saturday

**SAN FRANCISCO
CIVIC AUDITORIUM**

Heyden Chemical Corp., was elected chairman of the commission, succeeding Dr. Vlado A. Getting, of Massachusetts.

The commission, composed of representatives of Massachusetts, Rhode Island and Connecticut, was formed some eighteen months ago after legislators in the three states had approved compacts which had made each individual state responsible for abatement of stream pollution arising within its borders and entering a neighboring state.



George W. Hooker (left), who has joined Koppers Co., Inc., as chief engineer of the Chemical Division, and Harry M. Mitchell, named chief engineer of Jefferson Chemical Co. Mr. Hooker was formerly project manager of the Kellex Corp.

CALENDAR of EVENTS

AMERICAN CHEMICAL SOCIETY, 116th national meeting, Atlantic City, N. J., Sept. 19-23.
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, regional meeting, Montreal, Quebec, Sept. 18-21.
AMERICAN SOCIETY FOR TESTING MATERIALS, 1st Pacific Area National Meeting, Hotel Fairmount, San Francisco, Oct. 10-14.
EXPOSITION OF CHEMICAL INDUSTRIES, Grand Central Palace, New York City, Nov. 28-Dec. 3.
INSTRUMENT SOCIETY OF AMERICA, convention, Municipal Auditorium, St. Louis, Mo., Sept. 12-16.
PACIFIC CHEMICAL EXPOSITION, San Francisco, Nov. 1-5.
SCIENTIFIC APPARATUS MAKERS ASSOCIATION, mid-year meeting, laboratory apparatus section, Broadmoor Hotel, Colorado Springs, Colo., Sept. 28-30.
TANNERS COUNCIL OF AMERICA, leather show, Waldorf-Astoria, New York City, Sept. 7-8.
TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, fall meeting, Multnomah Hotel, Portland, Ore., Sept. 11-15.
WATER AND SEWAGE WORKS MANUFACTURERS ASSOCIATION, New England Water Works Association convention, Hotel Statler, New York City, Sept. 14-17.

Company Notes

The Selas Corp. of America, Philadelphia, has taken over the industrial dehumidification equipment activities of the equipment section, engineering division, The Davison Chemical Corp., Baltimore. R. S. Van Note, formerly manager of the equipment section, has joined Selas as manager of the dehydrator division.

Arapahoe Chemicals, Inc., of Boulder, Colo., producers of fine organic specialties, has appointed S. L. Abbott Co., exclusive sales agent for California. Abbott has offices in San Francisco and Los Angeles.

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The central sales development department of General Aniline & Film Corp. has been moved from New York to Easton, Pa., where the company's central research laboratory, with which it works in close conjunction, is located.



Horace Gooch, Jr. (left), elected president of the Society of the Plastics Industry, and George W. Russell, elected president of the Chemical Market Research Association. Mr. Gooch is treasurer of Worcester Moulded Plastics Co.; Mr. Russell is assistant sales manager, Industrial Chemicals Division, American Cyanamid Co.

PERSONNEL

Company Officers

• As a result of the retirement of E. E. Routh, vice-president, director of sales, **Mathieson Chemical Corp.** has made the following appointments: D. W. Drummond, to vice-president, director of industrial chemical sales, and S. L. Nevins, to vice-president, director of agricultural chemical sales.

• Howard E. Fritz, vice president—research of **The B. F. Goodrich Co.**, has been named 1949 winner of the Lamme Medal of Ohio State University. The award is made yearly to a graduate of an Ohio State technical department for "meritorious service in engineering of the technical arts."

• Hobart C. Ramsey has been elected president of **Worthington Pump and Machinery Corp.** He joined Worthington in 1920, and in 1945 was elected executive vice president; he succeeds Clarence E. Searle as president.

• Raymond C. Firestone, vice president of **The Firestone Tire and Rubber Co.**, will be in charge of Research and Development, a newly created executive post. He was elected vice president of the company in January.

Production

• Leland M. Jones, a member of the **Du Pont Co.**'s rayon organization for 16 years, has been appointed plant manager of the "Orlon" acrylic fiber plant which is now under construction at Camden, S. C. He is planning to establish headquarters there in the fall. Manufacturing operations are scheduled to begin the latter part of 1950.

• C. F. Smith, superintendent of the light oils division of the **Whiting, Ind., refinery of Standard Oil Co. (Indiana)**, has been promoted to assistant general superintendent of the Whiting refinery. He succeeds Roy J. Diwoy, who has become executive assistant to the presi-

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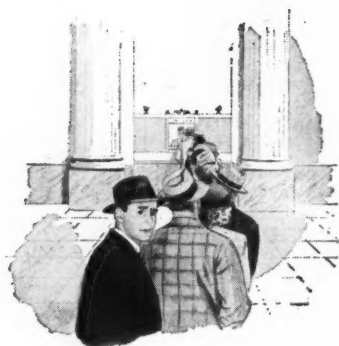
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dent and a director of Pan American Petroleum Corp., a Standard subsidiary.

• Russell L. Bauer has been named manager of the process section of the General Engineering Department, **Monanto Chemical Co.**

• **General Aniline & Film Corp.** has named M. R. Stevinson production manager of its Grasselli plant.

Sales

• Franklin B. Albright, for the past 11 years a sales representative for **Chas. Pfizer & Co., Inc.**, Brooklyn, N. Y., has been appointed field sales manager for the Midwestern region. He will be located at the company's new offices at 425 N. Michigan Avenue, Chicago, midwestern headquarters which will remain under the general managership of Norman A. Grimm.

• F. M. Urban has been named sales manager of engineered rubber products and H. Leon Moran, factory manager, Fort Wayne plant, **United States Rubber Co.**

Research

• Wilber Otis Teeters, formerly of Sun Chemical Co., has joined **The M. W. Kellogg Co.** at the Jersey City laboratory of its Petroleum and Chemical Research Department. He is associated with product development activities in the petroleum and chemical fields.

• Eugene W. Scott has been named first full-time executive secretary of the **Interdepartmental Committee on Scientific Research and Development**. He has been assistant executive secretary of the Research and Development Board of the National Military Establishment.

• The **Maneely Chemical Co.** has appointed Gordon Urquhart to its consulting staff. He is on the chemical staff of **America La France Foamite Company**, and is a director of **American Foam Company** and other companies.

• Ralph A. Lamm has been appointed chief of the Missile Engineering Section of the **National Bureau of Standards**, where he will direct guided missile engineering, including electronic, aerodynamic, servo-mechanic, and mechanical phases. He will also coordinate the Bureau's program with industry.

Associations

• Frank C. Hildebrand, General Mills, Inc., Minneapolis, Minn., who was president-elect, has become the new president of the **American Association of Cereal Chemists**. John Shellenberg, head of the Department of Milling Industry, Kansas State College, Manhattan, Kans., has been made president-elect as the result of a mail ballot conducted by the membership.

• Hillary Robinette, Jr., research director of **Amalgamated Chemical Corp.**, Philadelphia, textile chemical firm, has been elected chairman of the Philadelphia chapter, **American Institute of Chemists**. He succeeds Helmuth Pfleger, of Merck & Co., Rahway, N. J.



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CHEMICAL MARKETS

Stability Returning to Lead Industry

After the most precipitous drop in the history of lead prices, some stability has returned to the industry with a renewal of buying at 12 cents a pound. Industry officials trace the recent drop to a filling of dealers' and manufacturers' shelves with lead products after abnormal post-war demand, coupled with a low production rate, had forced the price to a record high of 21½¢ a pound. With pipelines filled and consumption curtailed because of price, the resultant toboggan to present levels was inevitable. Inventories are being worked off, and from now on more consumers will be buying normally than at any time in the past three years.

The current upswing is attributed to such consumers as manufacturers of storage batteries, lead sheathed cables, solder, pipe and the like. Future consumption by battery makers, if they produce 12 million batteries over the rest of the year to hit their estimated 17-18 million total for the year, will be at about last year's rate.

Tetraethyl lead, which consumed about 80,000 tons last year, will be produced in greater amounts as more cars and higher compression engines appear. New capacity will be in by early fall this year, and more is due next year. These factors indicate that TEL will more than double in the next five years.

The lead industry does not see such a bright picture in paint, for even at normal prices lead pigments are the most expensive types in this highly competitive field. Manufacturers have cut them out as much as possible, and it is not certain how easily they can win back their place. Red lead paints for iron and steel, however, seem to be regaining their lost markets. General construction is expected to continue at a high rate with lead for plumbing holding its own, but the chemical industry, which uses it for corrosion-resistant equipment, is likely to hold construction in abeyance.

Scarce Pickers Cause Lag in Drug Collections

Collection activity in the domestic crude drugs field is developing slowly, according to reliable trade sources. Industrial projects with their higher remunerative return during the war and postwar years are gradually thinning their lists of employed. Whether these former industrial workers can be enticed to return to the collection of botanicals at present-day prices remains to be proved.

Botanical arrivals from overseas aggregated nearly 1¼ million pounds in February, a 27 per cent increase over the

preceding month. The increased tonnage represented expanded arrivals of roots, barks, and flowers, and drugs of vegetable origin (advanced) included in basket classifications.

Other crude materials for drug and other uses were somewhat less than one-quarter the quantity of arrivals appearing on January import declarations. Controlling factors of this group are licorice root and tea waste. Both commodities were off considerably in February.

Linseed Oil Surplus Predicted

Potential domestic supply of linseed oil in 1949-1950 will be approximately twice annual consumption of recent years, according to a report of the Bureau of Agricultural Economics, U.S.D.A. This prediction is based on the large carryover of oil and flaxseed and the likelihood of another large flaxseed crop.

Since the support level for the current crop of flaxseed is \$3.99 a bushel, Minneapolis, as contrasted with last year's support price of \$6.00, the price of linseed oil is expected to drop about one-third from the present supported price of 26.7¢ a pound, f.o.b. mill Minneapolis, the report continued. If import controls scheduled to expire the end of June are not extended, the price may go even lower, for there are large exportable surpluses of linseed oil in Argentina and flaxseed in Canada. Moreover, with declining industrial activity, there will probably be a slackening in demand for products using drying oils.

Sulfur Production Close To 1948 Level

The domestic sulfur industry produced 402,711 long tons of native sulfur during the month of March according to reports of producers to the Bureau of Mines. This was an increase of nearly 15 per cent over February production and brought the total for the first quarter to 1,170,475 long tons—only slightly less than the first quarter of 1948.

Declines in 1948 Shown in Preliminary Figures

Preliminary statistics of the U. S. Tariff Commission on some synthetic organic chemicals reveal that production of coal-tar dyes and rubber-processing chemicals declined in 1948, while that of elastomers (synthetic rubber) remained substantially the same as in 1947. Sales of coal-tar dyes declined in volume, but increased in value; of rubber-processing chemicals, declined; and of elastomers, declined

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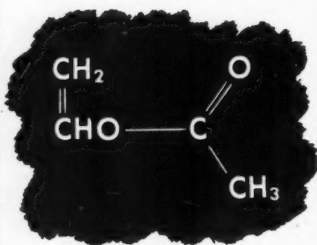
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slightly. These statistics are ninety-five per cent or better complete.

United States production of coal-tar dyes totaled 198 million pounds in 1948, or 7 per cent less than the record output of 212 million pounds reported for 1947. The quantity of sales in 1948 (185 million pounds) was somewhat smaller than the quantity reported for 1947; the value of sales in 1948 (161 million dollars) was, however, somewhat larger than in 1947.

As in former years, the output of four chemical classes of dyes accounted for about 85 per cent of the total output of dyes in 1948. These were: Azo dyes, which accounted for 44 per cent of the total; indigoid dyes, for 16 per cent; anthraquinone vat dyes, for 14 per cent; and sulfur or sulfide dyes, for 10 per cent. The production in 1948 of sulfur or sulfide and indigoid dyes decreased 51 per cent and 13 per cent, respectively, compared with 1947; and the azo and anthraquinone vat dyes each increased by 11 per cent.

United States production of rubber-processing chemicals totaled 96 million pounds in 1948, or 4.7 per cent less than the 101 million pounds reported for 1947. Sales in 1948 totaled 71.7 million pounds, valued at 36.4 million dollars; these figures are somewhat smaller than those reported for 1947.

Output of cyclic rubber-processing chemicals (chiefly accelerators and anti-oxidants) was 81.9 million pounds in 1948, compared with 85.8 million pounds reported for 1947.

Production of acyclic rubber-processing chemicals (accelerators, peptizers, anti-oxidants, and other products) amounted to 14.2 million pounds in 1948 as compared with 14.9 million pounds in 1947. Although the output of these acyclic chemicals as a group declined slightly in 1948 as compared with 1947, the output of some of the chemicals in the group increased.

Output of elastomers in 1948 was 1.2 billion pounds, approximately the same as in 1947. Sales, however, were somewhat smaller than in 1947.

Production in 1948 of cyclic elastomers, polybutadiene-styrene (GR-S) type, used chiefly in tires, amounted to 882 million pounds or 3.7 per cent less than in 1947. Cyclic elastomers, all GR-S type, accounted for 75 per cent of the output of all elastomers.

Production of special purpose types of acyclic elastomers in 1948, principally the polyisobutylene-isoprene (GR-I type), polyvinyl, and polychloroprene (Neoprene) elastomers was 291 million pounds, or 3.4 million pounds greater than the 287 million pounds reported for 1947.

ECA Authorizations

Among recent Economic Cooperation Administration procurement and reimbursement authorizations of materials to

be obtained in the United States and possessions were those for alcohol, amount \$460,000, and fertilizer and materials, amount \$540,000, to be shipped to the United Kingdom during the third quarter of 1949, and fertilizers and materials, amount \$540,000, to be shipped to the same country during the fourth quarter.

Market Review

Price reductions, notably in metallic chemicals and oils, continued to outweigh advances as the downward trend remained characteristic of chemical markets. Production levels were off as much as 10 to 20 per cent in some areas as activity slackened to about 1947 levels.

The long-awaited advance in ethyl alcohol established prices 8½-11¢ higher at levels where producers can operate in the black. This first reversal since the precipitous decline started last fall set the price of the pure tax-free material at 32¢ a gallon in tank cars, up 11¢. The heaviest selling formula, 2B, was posted at 31¢, a 9¢ increase. Among other large-volume formulas, proprietary solvent was listed 33½¢, up from 25¢; and completely denatured at 34¢, up from 25¢. This action was expected to stabilize the solvents market, and was followed by a 5½¢ increase in isopropyl alcohol which is competitive for some uses. Tank-car price of the 99 per cent material became 31¢ a gallon, and of the 91 per cent, 28¢.

Another segment experiencing a favorable turn was the insecticide business when demand suddenly sharpened due primarily to bugs. Calls for insecticides to combat corn borers and grasshoppers gave manufacturers their first real cause for joy in several seasons. Lots of DDT were snapped up as supply tightened.

Continued declines in non-ferrous metals were the leading depressing factors as their derivatives were reduced. Zinc dust, leaded and lead-free zinc oxides, zinc hydrosulfite, dibasic lead phthalate, normal lead salicylate, lead acetate, lead nitrate, dibasic lead nitrate, tribasic lead sulfate, lead peroxide, lead silicate, lead sulfate and tetraethyl lead were adjusted downward to conform with lower prices for the base materials.

Major activity in essential oils saw suppliers reduce California orange oil 75¢ a pound to a price of \$1 as they sought to stimulate business in the big soft-drink season. The Florida oil is at 50¢, a record low.

Phenol experienced some pickup with increased demand from consumers in the plastics, paints and lacquer, medicinal and rubber fields. The threatened coal strike spurred sales of benzol, toluol, and xylol as purchasers sought to build stocks. Little improvement was noted in phthalic anhydride. Refined naphthalene used in dyestuff intermediates manufacture was reduced 2¢ a pound to 9¢ in tank-car lots, but other grades were unchanged.

Menthol continued to pace the drug market as the price rose to \$11.25 a pound. However, it slackened off and dropped to \$11.10, and with stocks ample and a heavy crop expected, it was expected to follow this later trend.

Notable among other reductions was one of 3¢ in candelilla wax to make the refined 42¢, and the crude 37¢ a pound. Also down were benzoic acid, sodium benzoate, quicksilver, gum turpentine, coumarin and shellac.

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(Continued from page 78)

aged products. In collaboration with U. S. Industrial Chemicals, Inc., National Adhesives, Division of National Starch Products, Inc., now offers a range of adhesives containing piperonyl butoxide as the insect repellent.

The new adhesives, called the Beetle-Pel group, perform in the same manner as National Adhesive's regular packaging adhesives. Laboratory and field tests indicate that when suitable repellent stocks are bonded with the proper grade of Beetle-Pel, the attacks of confused or saw-tooth (cadelle) beetles fail to penetrate the packaging. In addition to sealing and wrapping packages, the new materials can be used to combine and laminate packaging materials, and thus form an excellent repellent barrier.

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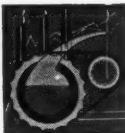
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left over the room will be effective for
several weeks.

Cordacide has not yet attained national
distribution but has been test-marketed in
Fla., Tex., and Calif., and is currently
being pushed city by city by local spot
advertising and area promotion. The tin
plate can (one standard size for a 1500
cu. ft. room) retails in drug, hardware,
grocery and department stores for \$98.
The tradename was registered in Aug.,
1948.

Laundry Chemical

**Laundry product eliminates souring,
requires less bleach.**

A new laundry chemical, Neutrophor,
which is said to eliminate the need for
souring and by requiring less bleach,
to extend the life of the fabric has come
out of the research laboratories of Car-
lton Chemical Co., Inc., New York. The
product is now available in commercial
quantities.

Fuel Oil Treatment

**Treatment said to promote better
burning, higher efficiency, less carbon
deposition.**

For the more effective atomization and
greater B.t.u. release of any grade of
fuel oil, a product known as "Dacarol A"
has been developed by the Dacar Chem-
ical Products Co. This product is an
activated fuel oil treatment which readily
attacks both oil sludges and water con-
densation.

Use of this material is said to result in

cleaner tanks and lines, less carbon de-
posits in preheaters and on burner tips,
less maintenance, and greater efficiency in
the operations of related fuel oil burning
equipment.

For effective results this product is ap-
plied direct to the storage tanks in pro-
portionate dosages per 1,000 gallons of
fuel oil. The material penetrates the en-
tire body of oil within a few hours.

Metal Cleaning Compound

**Cleaning bath effective on alumi-
num stampings.**

Northwest Chemical Co., 9310 Rose-
lawn Ave., Detroit, Mich., recommends
for cleaning aluminum parts heavily
coated with polishing composition, espe-
cially in recessed areas, a bath composed
of from 2 to 4 ounces per gallon of Al-
kalume #1 plus 2% by volume of Liquid
Stripper #2. The work is processed
through for a period of from two to five
minutes at 160° to 190° F. temperature,
depending upon the transfer time; fol-
lowed by a thorough rinse of the free
flowing or spray type.

Alkalume #1 is packaged in fiber drums
holding 400 lbs., and the Liquid Stripper
#2 in steel drums holding 500 lbs.

Bright Dip Compound

**New bright-dip formulation for met-
als reduces drag-out.**

The Rossaul Co., manufacturers of
Rossaul Copper-Brite, safe, non-toxic,
non-fuming bright dip for brass, bronze,
copper, beryllium copper, phosphor bronze

and nickel silver, has announced an im-
proved formulation that will lower drag-
out by 50% and produce a brighter,
passivated surface on these metals. This
additional economy makes Rossaul Cop-
per-Brite highly competitive in costs to
nitric and sulfuric which it replaces.

Rossaul Copper-Brite absorbs oxides
and fire scale leaving the above metals
in a bright passivated state, resistant to
future oxidation. As it is non-toxic and
non-fuming, special drainpipes or ventila-
tion is not required.

Metallic Stearates

**Arnold Hoffman introduces metal-
lic stearate line.**

A complete line of high grade metallic
stearates has recently been added to the
chemical specialties of Arnold, Hoffman
& Co. These stearates—aluminum, zinc,
calcium, magnesium and barium—are now
available for use in cosmetics, pharma-
ceuticals, plastics, lacquers, varnishes,
paints, rubber, lubricants, surface coatings,
waterproofing, cement and inks.

Silk Dye

**Hilton-Davis adds brilliant silk dye
to line.**

"Caribbean Blue" is the name of an
extremely brilliant silk dye added to the
line of textile dyes produced by Hilton-
Davis, Cincinnati. The firm is one of the
few producers of the color in this country.
Sometimes called setocyanine and having
the color index number of 663, it was
first produced for export to Japan.

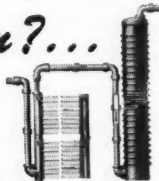
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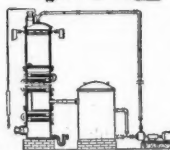
CHLORINE MANUFACTURE?

Answer:
Use Stoneware Headers,
Coolers and Drying Towers
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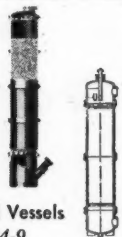
MURIATIC ACID MANUFACTURE?

Answer:
Use Stoneware & Impervite
Circulating and Falling
Film Systems
Send for Bulletin A2985
& B2986



NITRIC ACID RECOVERY?

Answer:
Use Stoneware Towers and
Porcelain Packing
Send for Bulletin HA



HYDROGEN PEROXIDE MANUFACTURE?

Answer:
Use Porcelain Towers and Vessels
Send for Bulletin B-2574-9



Write for the Bulletins that answer your particular corrosion problem... Write for Bulletin No. CHE-R3 for a description of the full scope of General Ceramics' manufacturing and service.

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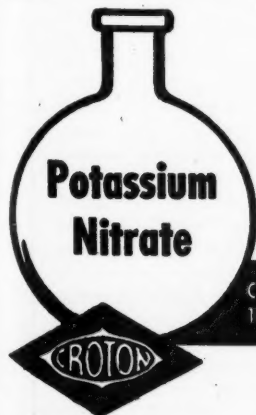


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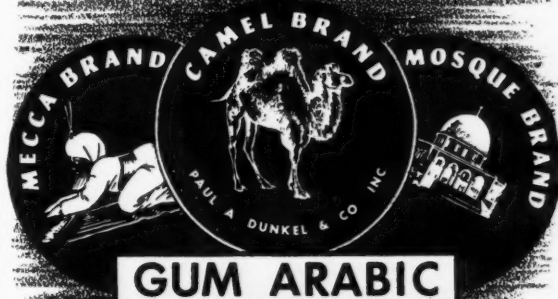
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FROM WHERE WE SIT

by "DOC"

Do YOU FEEL somewhat Daniel Boonish today, or a little St. Patricky? If so, you're probably an inorganic chemist, for Professor Don M. Yost, of Cal Tech, said recently that inorganic chemists are cast in the same heroic mold as the aforementioned worthies.

"Inorganic chemists are humble folk, and they don't pretend to know how to run the world, a country, a state, or its subdivisions. They do try, in their small way, to do constructive things. They admire the physicists, and don't mind too much doing miracles for them from time to time.

"Like Daniel Boone, they enjoy exploring both the known and the unknown and being close to earth. The reason we admire St. Patrick is because he too was an explorer and bringer of light in the face of considerable dangers. In his stride he on one hand discovered a fine well of drinking water in Ireland, and on the other hand brought that picturesque land to the serious attention of Europe.

"Of course, there are highly distinguished scientists who question that St. Patrick drove the snakes out of Ireland; but the facts being what they are, we are forced to suppose that these gentlemen are unrealistic, or in their youth got very low marks in eclecticism."

Anyhow, the same thing must be true of England, for it was in a British magazine, *Chemistry & Industry* we believe, that we came across this ode struck off on a similar occasion:

Hurrah for the brewery visit
And beer in liberal doses!
In the cause of science, what is it
But inspecting a technical process?



WE'RE TRULY FRIGHTENED by a machine that we read about last month. These electronic brains that solve complex problems before you can say "multiplicand" are bad enough, but this one—a sort of mechanical Plato—detects fallacies in logic. Throw in your major and minor premises and conclusion of a syllogism, for example, and lights flash indicating any one of seven different fallacies. We thought we had lost our last excuse for existence, viz., thinking, until we read the last, helpful sentence of the author's: "As with all such machines, its obvious limitation is that the 'argument' must first be put into logical form by a human being."



FRIEND OF OURS at the British Information Services was showing us recently what the Government over there is doing to let the people know what benefits they receive and what responsibilities they are obliged to assume under the ECA. We thought you'd be interested too (see cut).



IT'S A LITTLE LATE for this item, for it's in the Spring, we recall, that senior chemical engineering students make a field trip, passing judgment on various technical enterprises.

What American Aid Gives Us

FOOD JOBS TIME

American Aid gives us food
In 1941 the largest ton of every eleven we ate were paid for by American Aid. After 1942, when the Four Year Plan came to an end, Britain must pay for all that she ate.

American Aid gives us jobs
By helping to buy raw materials on which our employees depend. They are only one month of the cost we require, but the materials paid for by American Aid are used in British production and impossible to obtain elsewhere.

American Aid gives us time
American Aid gives us time for recovery, time to develop our industries and pay our own way, time to increase our efficiency and build up our trade in world markets. American Aid gives us time—but only till 1952, when the Four Year Plan comes to an end. One year of the four has already gone by.

American Aid gives us a challenge
The European Recovery Programme is calling on 17 Governments in Europe to work together, to plan their production and resources. By last position, heavy and worldwide trade, Britain is called upon to take a lead in doing what countries in Europe in America is helping Britain. It cost every American £2 10s. 6d. last year to help Britain and Western Europe. But Britain gave as well as received. It cost everyone in Britain £2 10s. 6d. last year to help Western Europe—and ourselves.

American Aid gives us all a part
Every job—in industry, commerce, agriculture and home—plays its part in the "Marshall Plan". By 1952, if Britain is to pay her way and lead Europe to recovery, production in Britain must be raised at least 10 per cent over 1947. We can only do this by greater efficiency, by making the most of machines, materials, and manpower. Above all, by co-operation—by everyone playing a part.

FIFTEEN YEARS AGO

(From Our Files of July, 1934)

Bureau of Mines has acquired all the gas rights in the 50,000-acre, Cliffside helium-bearing gas field near Amarillo, Texas. The field supplies raw material from which all helium used in the nation's military services is extracted in the Amarillo helium plant designed, built and operated by the Bureau.

Chlorinated hydrocarbon producers have signed agreements with the U. S. Public Health Service to place warning labels on all packages in excess of 15 oz. The industry prefers this voluntary system of warning labels to Congressional action forcing the labeling of all volatile poisons.

Thomas Blass, who collaborated during the war with Thomas Alva Edison on a method of producing picric acid from benzol, died at 73.

American Cyanamid & Chemical has acquired plant, properties and business of Burton Explosives, Inc., Cleveland, Ohio. The 415-acre plant is at New Castle, Pa., and has an 18-million-lbs. annual capacity.

A method of electroplating rubber and combining it with metals has been reported by Dr. Andrew Szeerari of the Universities of Budapest and Berlin. The rubber-metal composition can be used to line pipes, making them impervious to acids.

The New York Journal of Commerce, commenting on third-quarter business, states: "The 3rd quarter of the current year is likely to prove the worst for many industries, both in respect of volume of activity and profits."

THIRTY YEARS AGO

(From Our Files of July, 1919)

Orlando T. Weber, president of National Aniline, has appointed Robert T. Baldwin as assistant to the president.

The plant of Union Dye and Chemical Co. at Kingsport, Tenn., has been closed pending settlement with the Government for heavy chemicals delivered during the war.

The U. S. Alkali Export Association, Inc., has been organized. Monsanto Chemical Co. will spend \$10,000 for various alterations and improvements prior to its occupancy of the four-story building at 12 Platt St., New York City.

Refined camphor prices are rising as a result of a monopoly under Japanese control.

Chemists, Engineers, Executives:

DO YOU HAVE THESE CURRENT REFERENCES?

Listed below are the articles appearing recently in Chemical Industries that our readers—as indicated by their demand for reprints—have found most helpful and worthwhile. Informative, comprehensive, and up-to-the-minute, they are the “last word” on the subjects they cover. Reprints may be obtained at the prices quoted.

*At 10 cents per copy**

A.S.M.E. Standard Automatic Control Terminology
May, June, and July, 1946 ☐

Centrifugals Replace Tables for Separation of Starch and Gluten

by Robert L. Taylor, January, 1948 ☐

Emulsion Paints, The “Mayonnaise Principle” Revolutionizes Coatings

by George M. Sutheim, June, 1947 ☐

Making 1080 Safe

by R. F. Jenkins and H. C. Koehler, February, 1948 ☐

Quaternary Ammonium Germicides

by C. A. Lawrence, January, 1947 ☐

What Makes a Good College Trainee for Chemical Companies?

by Robert N. McMurry, January, 1949 ☐

*At 50 cents per copy**

Agitators for Liquids

by Julian C. Smith, March, 1949 ☐

Cellulose

by Merle Heath, March, 1948 ☐

Diaphragm vs Amalgam Cells

by Robert B. MacMullin, July, 1947 ☐

Drying Oils

by George M. Sutheim, January and February, 1948 ☐

Employee Relations Practices in the Chemical Industry

by Robert C. Forney, November, 1948 ☐

Industrial Carbon

by Raymond B. Ladoo and C. A. Stokes, October, 1948 ☐

Phenol

by R. F. Messing and W. V. Keary, July and August, 1948 ☐

Survey of Starch, Protein and Synthetic Resin Adhesives
by Alexander Frieden, October, November, December, 1946 ☐

Synthetic Chemicals for Agriculture

by R. H. Wellman, June and August, 1948 ☐

Synthetic Detergents, Main Types, Uses, Properties and Prospects

by John W. McCutcheon, November, 1947 ☐

Urea and Melamine Resins Press Toward New Goals

by James R. Dudley, February, 1949 ☐

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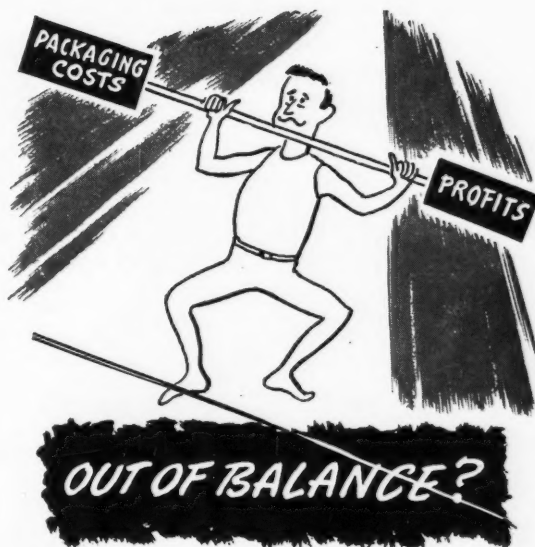
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U. S. Patents from Official Gazette—Vol. 620, Nos. 3, 4, 5 (Mar. 15-Mar. 29) Canadian Patents Granted and Published Mar. 8-Mar. 29

*Specialties

Sealing tape comprising a strip of backing material and a thermoplastic and solvent-applicable adhesive composition consisting of ethyl cellulose, hydrogenated rosin and dihydro methyl abietate. No. 2,462,037. Lewis Davis and Edwin C. Tuukkanen (to McLaurein-Jones Co.).

Warp sizing material comprising a starch selected from the group consisting of corn and wheat starches and waxy maize starch. No. 2,462,108. Fred G. La Piana (to Stein, Hall & Co., Inc.).

Silicone surfaced cooking implement. No. 2,462,242. Paul S. Webb and John R. Koster.

Thermal insulating building material from solid light weight porous aggregate particles, a solution of a water soluble alkali metal silicate, and an alkali earth metal compound reactive with said silicate, dehydrating said mixture to assume pelletized form upon agitation, agitating, compressing and heating to convert it to a hard integrated mass of high compression strength. No. 2,462,338. Jos. S. Nagel.

Lubricating oil containing an antioxidant, $(\text{RAR})_m\text{HnBO}_3$, where Ar is an aryl nucleus, R represents at least one alkyl radical, the alkyl radicals containing a total of at least 16 carbon atoms, m is an integer from 1-3, n is 0, 1 or 2, and $m+n$ equal 3. No. 2,462,616. Lawrence T. Eby and Louis A. Mikeska (to Standard Oil Development Co.).

Preventing corrosion of metals during distillation of hydrogen cyanide from an aqueous solution of hydrogen cyanide, ammonium salts and sulfuric acid, obtained by scrubbing formamide decomposition products with dilute sulfuric acid, the step which comprises contacting a distillation vessel made of steel having a chromium content of 16-23% and a nickel content of 7%-11%, with the aqueous solution having dissolved copper in ionizable form. No. 2,462,638. Harry C. Heterington (to E. I. du Pont de Nemours & Co.).

Stabilizing an oleaginous material of animal origin by incorporating a compound containing an enediol group, α -amino-benzoic acid, and caffeic acid. No. 2,462,663. Frank A. Norris (to General Mills.).

Stabilization of oleaginous materials by a compound containing an enediol group, and a compound selected from the group consisting of gallic acid and its lower aliphatic esters. No. 2,462,664. Frank A. Norris (to General Mills, Inc.).

Flameproofing composition comprising chlorinated paraffin wax, a water-soluble urea-formaldehyde condensation product, and antimony oxide. No. 2,462,803. Kenneth S. Campbell and Jack E. Sands (to U. S. A. by Sec. of Agriculture).

Non-corrosive paste-like composition for preventing the tenacious adhesion of frost to chilled surfaces consisting of white mineral oil, calcium chloride, a water insoluble calcium soap of higher fatty acids and an inorganic iron rust inhibitor. No. 2,462,970. John B. Holtzclaw (to Standard Oil Development Co.).

Water resistant adhesive composition comprising ungelatinized starch, urea and formaldehyde resin in a water dispersible state, gelatinized starch hydrosol forming material, water and an acid material. No. 2,463,148. Geo. V. Caesar, Jordan V. Bauer and Don M. Hawley (to Stein, Hall & Co., Inc.).

Lubricant containing hydrocarbon oil and a polyhydroxy aromatic compound of the group consisting of a polyhydroxy aromatic alcohol and a polyhydroxy aromatic aldehyde, and a neutralized phosphorus and sulfur-containing reaction product of a phosphorus sulfide and an olefin polymer. No. 2,463,429. Edward N. Roberts (to Standard Oil Co.).

Removable adhesive sheet comprising a fibrous backing material having a tacky coating consisting of polyisobutylene, dibutyl sebacate as an anti-adhesive transfer agent, and mineral oil as an extender. No. 2,463,452. Geo. W. Yule (to E. I. du Pont de Nemours & Co.).

Color stabilization of pyrrole with a biguanide. No. 2,463,478. Albert V. Cabal and Hollis G. Oliver (to Socony-Vacuum Oil Co., Inc.).

Preservative for photolithographic plates consisting of gum acacia, potassium alum, sodium sulphate and water. No. 2,463,554. Edmund D. Osinski and Geo. W. Bucklin.

Laundry sour having antichlor action, consisting of a sour selected from the group consisting of water-soluble acid fluorides and water-soluble fluosulfates. No. 2,463,761. Edwin S. Garverich (to Pennsylvania Salt Mfg. Co.).

Preparing a rosin soap grease by heating hydrocarbon oil and unpolymersed rosin in the presence of a catalyst selected from the class consisting of sulfur, selenium, and tellurium but in the absence of a hydrogenation catalyst. No. 2,463,823. Alfred W. Westkamp (to Standard Oil Co.).

Oxidation resistant organic substances, the condensation product obtained by reacting an amino-aromatic aldehyde, free of hydroxy substituents. No. 2,463,836. Roger W. Watson (to Standard Oil Co.).

Flame-proofing composition comprising a thermally unstable chlorinated resinous material, a dechlorinating agent from the class consisting of zinc oxide and zinc hydroxide, and an inhibiting compound comprising gilsonite for preventing dechlorination of the resin. No. 2,463,985. Earl W. Leatherman.

Air-deodorizing composition in the form of a solid mass containing a formaldehyde-polymer depolymerizing catalyst from the group consisting of inorganic acids and acid-reacting inorganic salts and a homogeneously blebbed mixture of formaldehyde polymers. No. 2,464,043. Jonas Kamlet (to Boyle-Midway, Inc.).

Sugar cane wax refining by contacting with a liquid fat solvent selected from the group consisting of acetone, methylethylketone, ethyl ether,

pentane, hexane, and heptane. No. 2,464,189. Oscar J. Swenson (to Colonial Sugars Co.).

Canadian

Producing a solid fuel pellet composed of hexamethylene-tetramine, paraffin and an alkali metal nitrate. No. 454,458. John W. Speaker.

Flux composition containing sodium carbonate, sodium sesquicarbonate, sodium chloride, calcium fluoride, and the remainder borax glass. No. 454,503. Kenneth H. Koopman (to Haynes Stellite Co.).

Preservative wrapper for citrus fruit comprising tissue paper impregnated with a solution of paraffin in mineral oil, also containing pine oil providing between 0.6 and 1.8 per cent alpha terpineol. No. 454,631. Robert Allison Baum and John Robert MacRill (to Fernstrom Paper Mills, Inc.).

Production of coloured smokes from a mixture of an organic dyestuff, an ignitable heat producing compound to volatilize the dyestuff to produce a coloured smoke, and urea for stabilizing the combustion. No. 454,713. John W. Orelup.

Cement for bonding foils having a basis of a lower fatty acid ester of cellulose to surfaces of textile fabrics and other materials, comprising nitrocellulose and a substance which is a plasticizer for the nitrocellulose dissolved in a solvent mixture consisting of acetone and mono methyl ether of ethylene glycol. No. 454,804. Bjorn Anderson (to Celluloid Corp.).

Bonded abrasive article comprising abrasive particles and a co-polymer of butadiene with a halogen-substituted vinyl compound. No. 454,835. Charles Edward Wooddell, Garret Van Nimwegen and Edward Tittle Hager (to The Carborundum Co.).

Dielectric composition comprising barium titanate and an alkaline earth metal zirconate. No. 455,202. Eugene Wainer (to Titanium Alloy Mfg. Co.).

Ceramic dielectric comprising barium titanate with a small admixture of magnesium titanate. No. 455,203. Eugene Wainer (to Titanium Alloy Mfg. Co.).

*Textiles

Manufacturing artificial fiber from proteins contained in cotton seed. No. 2,462,933. Jett C. Arthur, Jr., Melvin L. Karon, Adrian F. Pomes and Aaron M. Altschul (to U. S. A. by Sec. of Agriculture).

Agricultural

Insecticidal spray oil containing lecithin. No. 2,465,335. Myron J. Burkhard (to Socony-Vacuum Oil Co., Inc.).

Insecticidal composition comprising a light hydrocarbon oil and an alkylated benzylidene aliphatic aldehyde. No. 2,465,854. Stephen C. Dorman and Seaver A. Ballard (to Shell Development Co.).

Arylidene alicyclic ketone insecticide. No. 2,465,855. Stephen C. Dorman and Seaver A. Ballard (to Shell Development Co.).

Cellulose

Cellulose ester and ether products colored with a dinitro-phenoxa zine or -phenothiazine. No. 2,464,885. Henry Charles Olpin and Philip Broughton Law (to Celanese Corp. of America).

Ethyl cellulose having incorporated therewith as color-stabilizing agent, a member of the group consisting of sulfur dioxide, unstable organic sulfones. No. 2,465,914. William J. Myles (to Celanese Corp. of America).

Color-stable composition of matter resistant to color changes comprising a thermoplastic cellulose derivative of the group consisting of cellulose ethers and cellulose esters having incorporated therewith as a color stabilizing agent a polyhydroxy alcohol ester of sulfurous acid. No. 2,465,915. William J. Myles and John H. Prichard (to Celanese Corp. of America).

Canadian

Extracting cellulose from a fibrous material by impregnating with nitric acid just sufficient for attacking the incrustations of said material, and removing the incrustations attacked by said acid. No. 454,923. Henri Mainguet.

A regenerated cellulosic pellicle impregnated with an aqueous solution comprising guanidine thiocyanate to plasticize said material and render it fire retardant. No. 454,948. Charles Marvin Rosser (to American Viscose Corp.).

Ceramics

Increasing the blackening resistance of alkali-alumina-borosilicate glasses by treating with water until the glass has attained maximum chemical stability, and thereafter heating. No. 2,464,851. James K. Davis (to Corning Glass Works).

Making a vitrified refractory masonry unit by commingling and mixing

* U. S. Patents from Vol. 619, Nos. 2, 3, 4. Vol. 620, Nos. 1, 2. Canadian from Feb. 8-Mar. 15.

particles of fire clay and amorphous graphite. No. 2,465,375. Robert R. Hendren (to McFeely Brick Co.).
Manufacture of silicon carbide refractory bodies consisting of silicon carbide and a coating material comprising finely divided zirconium oxide. No. 2,465,672. Emil Blaha (to Selas Corp. of America).

Canadian

Vitreous enamel frit, for use as a protective coating on the surface of aluminum and aluminum-rich alloys, which comprises PbO , SiO_2 , Li_2O , Na_2O , K_2O and TiO_2 . No. 455,333. Alden Johnson Deyrup (to E. I. du Pont de Nemours & Co.).
Vitreous enamels comprising Na_2O , K_2O , Li_2O , CaO , ZnO , Al_2O_3 , B_2O_3 , P_2O_5 , SiO_2 , F_2 and ZrO_2 . No. 455,366. Harold D. Prior (to Titanium Alloy Mfg. Co. and National Lead Co.).

Coatings

Water-repellent coating composition consisting of paraffin wax and a petroleum-base asphalt. No. 2,464,759. Thomas P. Camp (to U. S. Gypsum Co.).
Film-forming solution of cellulose acetate consisting of cellulose acetate, an organic solvent, triethyl phosphate, and triphenyl phosphate. No. 2,464,784. Russell P. Easton (to General Aniline & Film Corp.).
Wrinkle coating composition comprising a resin resulting from the reaction of glycerol, phthalic anhydride and fatty acids; a top drier; and hydrocarbon diluent. No. 2,465,243. Enrique L. Luaces (to New Wrinkle, Inc.).
Producing phosphate films on metals. No. 2,465,247. Byron V. McBride, (to Westinghouse Electric Corp.).
Polysulfide coating and sealing material. No. 2,465,513. Frederic M. Carasso (to Lockheed Aircraft Corp.).
Synthetic rubberlike coating and sealing compound comprising an aqueous dispersion of a polyalkylene polysulfide. No. 2,465,552. Perry M. Reedy, Jr. (to Lockheed Aircraft Corp.).

Canadian

Anticorrosion coating composition for metals comprising an oily material containing a fatty amido-amine containing fatty chains of from 10-22 carbon atoms. No. 455,039. John J. Miskel (to National Oil Products Co.).
Coating articles having a copper surface, by applying to the copper surface a solution containing an organic solvent, water, ammonia, and one of the group consisting of water-insoluble partially hydrolyzed polyvinyl esters, and water-insoluble polyvinyl acetal resins containing free hydroxyl groups, permitting the liquids of the solution to remain in contact with the copper surface until a bluish-green colour is observed, heating and forming an adherent, alcohol-insoluble film on said surface. No. 455,499. George M. Powell, 3rd, and Earl F. Carlston (to Carbide and Carbon Chemicals, Ltd.).

Detergents and Surface Active Media

Canadian

Detergent composition consisting of a neutral water-soluble salt of an alkyl aryl sulphonic acid and a water-soluble sulphate selected from the group consisting of alkali metal and alkaline earth metal sulphates. No. 454,937. Paul T. Ziznia and Thomas L. McKenna (to National Aniline & Chemical Co., Inc.).
Cleansing and laundering composition comprising a mixture of a detergent selected from the group consisting of water-soluble salts of organic sulphonic acids and water-soluble salts of aliphatic sulphuric acid esters, and an amide of the formula $R \cdot CO \cdot NR' \cdot R''$ wherein $R \cdot CO$ is an acyl radical of a fatty acid having 10 to 14 carbon atoms and R' and R'' are selected from the group consisting of hydrogen and alkyl radicals having 1 to 4 carbon atoms. No. 455,051. Albert S. Richardson and Walter H. McAllister (to Procter and Gamble Co. of Canada, Ltd.).
Cleansing composition comprising a mixture of a water soluble salt of a mixture of alkyl sulphuric acids consisting of lauryl sulphuric acid, and lauroyl morpholine. No. 455,052. Nathaniel Beverley Tucker (to Procter & Gamble Co. of Canada, Ltd.).
In producing an improved wetting, sudsing and detergent agent of the formula, $R \cdot CO \cdot OR_1 \cdot SO_3Na$, where $R \cdot CO$ is the acyl radical of a fatty acid having eight to twenty-two carbon atoms, R_1 is a radical selected from the group consisting of alkylene and hydroxy alkylene radicals having two to four carbon atoms and Me is a metal forming a water soluble salt. No. 455,053. Nathaniel Beverley Tucker (to Procter & Gamble Co. of Canada, Ltd.).

Dyes & Pigments

Chromable monoazo pyrazolone dyes. No. 2,464,322. Adolf Kresber and Peter Hindermann (to J. R. Geigy, A. G.).
Unsymmetrical cyanine dye. No. 2,464,537. Douglas William Stammers (to Imperial Chemical Industries, Ltd.).
Monoazo compounds containing a thiazolone cyanine dye component. No. 2,464,785. Thomas R. Thompson (to General Aniline & Film Corp.).
Water-soluble phthalocyanines containing quaternary or ternary salt groups. No. 2,464,806. Norman Hulton Haddock and Clifford Wood (to Imperial Chemical Industries, Ltd.).
Dye intermediates. No. 2,465,067. James Oliver Corner and David Willcox Woodward (to E. I. du Pont de Nemours & Co.).
Water-soluble dyestuffs of the phthalocyanine series, by sulfonating an arylthioether of a phthalocyanine. No. 2,465,089. Ernst Gutzwiller (to Sandoz, Ltd.).
Sensitizing dye containing styryl dye nuclei. No. 2,465,412. Cyril D. Wilson (to E. I. du Pont de Nemours & Co.).
Condensing a hydrocarbon bis-heterocyclic quaternary nitrogen salt and recovering a polymeric cyanine dye. No. 2,465,774. Cyril D. Wilson (to E. I. du Pont de Nemours & Co.).

Canadian

Cyanine salt wherein the union is the negative radical of a sulfonic acid. No. 454,994. Edmund Barrus Middleton (to E. I. du Pont de Nemours & Co.).

Explosives

Detonator comprising of lead azide and fibrous nitrocellulose. No. 2,464,777. Leon Rubenstein and Bertram Campbell (to Imperial Chemical Industries, Ltd.).

Canadian

Priming mixture for ammunition containing polyvinyl alcohol as a mass

detonation inhibitor. No. 455,382. Willi Brun and Gordon Maxwell Calhoun (to Remington Arms Co., Inc.).

Inorganic

Gas purification process in which process coke-oven gas is scrubbed with an aqueous solution of alkali-metal carbonate and hydrogen sulphide is absorbed. No. 2,464,805. Herbert A. Gollmar (to Koppers Co., Inc.).
Producing compressed oxygen. No. 2,464,891. Philip K. Rice (to Linde Air Products Co.).
Preparing a phosphate-impregnated acid-treated activated charcoal. No. 2,464,902. Kenneth Barton Stuart (to Colorado Fuel and Iron Corp.).
Production of hydrogen from natural gas by partial combustion with oxygen, conversion of the carbon monoxide to carbon dioxide by the water-gas shift. No. 2,465,235. Naci F. Kubicek (to Shell Development Co.).
Producing high purity hydrated magnesia by treating hydrated lime with magnesium chloride brine. No. 2,465,264. Robert D. Pike (to Harbison-Walker Refractories Co.).
Producing a catalytic article by electrodepositing a lead coating on a foraminous iron supporting structure. No. 2,465,773. Christian J. Wernlund (to E. I. du Pont de Nemours & Co.).

Canadian

Electrolyte for zinc anode batteries comprising an aqueous solution of sodium hydroxide and salt. No. 455,449. George Patrick Burchak.
Recovering magnesia from materials containing it and mineral impurities by hydrating the material to change the relative specific gravity and subjecting the treated material to gravity classification. No. 455,537. Monson Fraser Goudge (to His Majesty the King in the right of Canada by the Minister of Mines and Resources).

Metals

Recovering zinc from zinc ore by smelting with formation of a gaseous mixture containing zinc vapor, carbon monoxide and carbon dioxide, shock-chilling with circulating molten lead to cause the gaseous mixture to cool to a temperature below that at which the carbon dioxide can react with the zinc to form objectionable zinc oxide and condensing the zinc vapor as a solution of zinc in the lead. No. 2,464,262. Stanley Robson and Leslie Jack Derham (to National Smelting Co., Ltd.).
Concentrating vanadium ores by attrition followed by froth flotation, employing a lead salt and a member of the group consisting of higher fatty acids, naphthenic acid and soaps derived from such acids and recovering quartz as a flotation product. No. 2,464,313. Arthur J. Weinig (to Vanadium Corp. of America).
Chemically forming an oxide coating on aluminum surfaces by treating with an aqueous solution, alkali metal carbonate and polyvinyl alcohol. No. 2,464,596. Ralph B. Mason (to Aluminum Co. of America).
Production of metallic calcium by heating briquettes of a mixture of finely divided metallic aluminum and a finely divided lime material at a temperature of about 1170° C. and at a pressure of the order of 10 microns. No. 2,464,767. Lloyd Montgomery Pidgeon and Sidney Alexander McCatty (to Dominion Magnesium, Ltd.).
Producing metallic sodium by forming a mixture consisting of sodium chloride, silicon and an alkaline earth metal oxide and heating in a high vacuo to 850° C. No. 2,465,730. William J. Kroll.

Organic

Alkylamino alkyl bromides. No. 2,464,199. Robert C. Elderfield and Frederick Brody (to U.S.A. by the Director of the Office of Scientific Research and Development).
Making a modified drying oil which is color stable and fast drying by heating a drying oil acids-polyhydric alcohol ester containing free hydroxyl groups, with a dicarboxylic acid monoester of an unsaturated monohydric alcohol containing from 3 to 4 carbons. No. 2,464,202. John B. Rust (to Monro Research Corp.).
Hydroxy-hydroxy-diphenyl-methane having a hydroxyl on each of the phenyl rings in one of the positions ortho, meta and para to the methylene bond. No. 2,464,207. Howard L. Bender, Alford G. Frannham and John W. Guyer (to Bakelite Corp.).
Production of methyl vinyl ketone by hydrolyzing a mixture of a normal 3 halo-1-butene and a normal 4-halo-2-butene and forming a mixture of unsaturated alcohols, separating a 3-hydroxy-1-butene, readily isomerizable to a 4-hydroxy-2-butene and converting separated 3-hydroxy-1-butene to a vinyl ketone. No. 2,464,244. Irving E. Levine and William G. Toland, Jr. (to California Research Corp.).
Preparing a guanidine sulfate by reacting urea with a member of the group consisting of sulfamic acid and a salt thereof. No. 2,464,247. Johnstone S. Mackay (to American Cyanamid Co.).
Quaternary ammonium halides of benzhydryl ether derivatives. No. 2,464,260. George Rieveschl, Jr. (to Parke, Davis & Co.).
Manufacture of trichloromethyl di (para-chlorophenyl) methane from chloral and monochlorobenzene. No. 2,464,265. Norman E. Searle (to E. I. du Pont de Nemours & Co.).
Removal of odor-producing impurities from crude acetic anhydride formed by the catalytic vapor phase dehydration of acetic acid while employing a dehydration catalyst containing an ammonium phosphate by adding sodium nitrite and fractionally distilling purified acetic anhydride therefrom. No. 2,464,345. Herman Rainalter and Dorsey A. Ensor (to Celanese Corp. of America).
Making alkyl acrylates by cracking a lactate. No. 2,464,364. Francis Clarke Atwood (to Atlantic Research Associates, Inc.).
In making tetraethyl lead by reaction of ethyl chloride on lead monosodium alloy, the improvement which comprises carrying out the reaction in the presence of a ketone in which each carbonyl carbon is doubly bonded to an oxygen atom, forms no part of a benzene ring, and is singly bonded to each of two different carbon atoms. No. 2,464,397. George Edward Holbrook (to E. I. du Pont de Nemours & Co.).
In making tetraethyl lead by reaction of ethyl chloride on lead monosodium alloy the improvement which comprises carrying out the reaction in the presence of an ester of a carboxylic acid. No. 2,464,398. W. J. Clem and R. J. Plunkett (to E. I. du Pont de Nemours & Co.).
In making tetraethyl lead by reaction of ethyl chloride on lead monosodium alloy, the improvement which comprises carrying out the reaction in the presence of an amide of a carboxylic acid. No. 2,464,399. Willis Jackson Clem (to E. I. du Pont de Nemours & Co.).
Production of pentaerythritol cyclic monoformal by extraction of formaldehyde bipentaerythritol acetal from a mixture with pentaerythritol and dipentaerythritol by use of a solvent selected from the group consisting of n-propanol, isopropanol and butyl acetate. No. 2,464,430. Robert H. Barth and John E. Snow (to Heyden Chemical Corp.).
A diallyl dicarbamate from diallyl carbonate and diamine. No. 2,464,519. Joy G. Lichty and Nelson V. Seeger (to Wingfoot Corp.).

Production of nitroparaffins by treating a catalyst consisting of metallic aluminum with gaseous nitrogen peroxide, subsequently heating nitrogen peroxide and at least one paraffin hydrocarbon in the presence of the treated catalyst. No. 2,464,572. Kenneth William Gee (to Imperial Chemical Industries, Ltd.).

m-Acetylacetamidobenzaldehyde acetals of alkanols of 1 to 4 carbon atoms and 1,2 and 1,3-alkanediols of 2 to 4 carbon atoms. No. 2,464,597. David Malcolm McQueen (to E. I. du Pont de Nemours & Co.).

Preparing diphenyldihaloethanes. No. 2,464,600. Erich F. Meitzner and William F. Hester (to Rohm & Haas Co.).

Continuous grignard method. No. 2,464,685. Alfred Hirsch (to Diamond Alkali Co.).

4,4' Bis (amino-t-butyl) substituted aromatic hydrocarbons. No. 2,464,692. William Kirk, Jr., and Richard Seyfarth Schreiber (to E. I. du Pont de Nemours & Co.).

Production of an unsaturated nitrile by the interreaction of a conjugated diolefin and hydrogen cyanide with acetonitrile as a diluent under anhydrous conditions contact anhydrous cuprous chloride. No. 2,464,723. Walter A. Schulze and John E. Mahan (to Phillips Petroleum Co.).

Alkyl 3-(alkenoxy)-alkanoates. No. 2,464,740. David E. Adelson (to Shell Development Co.).

Grignard reagent characterized by a paraffin wax organic radical of more than 20 carbon atoms. No. 2,464,751. Frederick P. Richter (to Socony-Vacuum Oil Co., Inc.).

Production of bis (beta, gamma dichloro-n-propyl) ether by reacting di-allyl ether with chlorine. No. 2,464,758. Paul H. Williams and Theodore W. Evans (to Shell Development Co.).

Preparing an ester of acrylic acid by passing hydracrylic acid and an alcohol through an acidic dehydrating catalyst. No. 2,464,768. Bryan C. Redmon and George R. Griffin (to American Cyanamid Co.).

Alkamine esters of pyrrole-3,4-dicarboxylic acids. No. 2,464,770. Donald E. Sargent (to American Cyanamid Co.).

In manufacture of a thiuram disulfide by oxidation of a salt of a dialkyl dithiocarbamic acid, the process comprising introducing salt and a mineral acid into an aqueous solution of an oxidizing agent chosen from the class consisting of salts and alkyl esters of nitrous acid. No. 2,464,799. John L. Eaton (to Sharples Chemicals, Inc.).

In recovering carbazole from crudes comprising carbazole, anthracene and phenanthrene in which the carbazole is converted to a metal carbazolate, and regenerated, the improvement which comprises heating the crude in an inert solvent containing an alkali metal alcoholate in alcohol to precipitate the carbazolate. No. 2,464,811. Thomas H. Insinger, Jr. (to Koppers Co., Inc.).

Catalyst for oxidation of furfural consisting of the reaction products resulting from heating ammonium vanadate, ammonium molybdate, ammonium phosphate, and ammonium hydroxide and containing a promoter. No. 2,464,825. Erik R. Nielsen (to Quaker Oats Co.).

2,5 - di(2' - anthraquinonyl) - 1,3,4 - oxadiazoles which carry in at least one of the anthraquinone radicals in the 1'-position a radical of the group consisting of NO₂ and NH₂. No. 2,464,831. Frederic B. Stilmar (to E. I. du Pont de Nemours & Co.).

Producing refined carbazole from crude carbazole comprising: heating a mixture of the crude carbazole and an alkali metal phenolate to form alkali metal car azolate; separating the anthracene; treating the separated carbazolate with phenol to form carbazole. No. 2,464,833. Wojciech Swietoslowski (to Koppers Co.).

Producing 1,1,1-trichloro-5-bromo-2,3-dicarboxy alkanes, substituted 1,1,1-trichloro-5-bromo-2,3-dicarboxy alkanes and their dehydro-

brominated derivatives by heating a mixture containing 1,1,1-trichloro-5-bromo-2,3-dicarboxy propane, a terminally unsaturated olefin and a peroxidic polymerization catalyst. No. 2,464,869. Morris S. Kharasch (to U.S. Rubber Co.).

Aryl ethers, ROC₆H₄CF₃, wherein R represents an aryl group. No. 2,464,877. Moushy Markarian and D. B. Peck (to Sprague Electric Co.).

Converting an olefin into an alcohol by carbonylating said olefin with carbon monoxide and hydrogen in the presence of a catalyst containing a metal selected from the group consisting of cobalt and iron, and subsequently hydrogenating the resulting aldehyde. No. 2,464,916. Chester E. Adams and Donald E. Burney (to Standard Oil Co.).

Esters of acyloxy-carboxylic acids. No. 2,464,992. Chessie E. Rehberg and Charles H. Fisher (to U.S.A. by Secretary of Agriculture).

Manufacture of heptan-3:4-dione and alpha-ethyl beta-propyl acrylic acid by oxidizing alpha-ethyl beta-propyl acrolein with molecular oxygen. No. 2,465,012. Bruce Duval and Alec Elce and Karl Heinrich Walter Tuercik (to Distillers Co., Ltd.).

Distillable monoalkylsiloxanes having the formula (RSiO_{1.5})_n, in which R is an alkyl radical containing from 2 to 6 carbon atoms, and in which the average degree of polymerization represented by n is from 8 to 24. No. 2,465,188. Arthur J. Barry and John W. Gilkey (to Dow Corning Corp.).

Synthesis of 4-hydroxycoumarins. No. 2,465,293. Mark A. Stahmann and Karl Ful Link (to Wisconsin Alumni Research Foundation).

Laevo rotatory form of α-hydroxy-β,β-dimethyl-γ-butyro lactone. No. 2,465,303. Roger J. Williams (to Research Corp.).

Arsono Compounds. No. 2,465,307. Herman Herbert Fox and Wilhelm Wenner (to Hoffmann-La Roche, Inc.).

Compound selected from the group consisting of N-(p-arsenosobenzyl)-glycineamide and the acid addition salts thereof. No. 2,465,308. Herman Herbert Fox and Wilhelm Wenner (to Hoffmann-La Roche, Inc.).

Vinyl halo benzoates. No. 2,465,316. David T. Mowry and George E. Ham (to Monsanto Chemical Co.).

Vinyl alkoxy benzoates. No. 2,465,317. David T. Mowry and George E. Ham (to Monsanto Chemical Co.).

Chalcones and process for their manufacture. No. 2,465,320. Franz Bergel, Aaron Cohen, John Wynne Hayworth and Edward Graham Hughes (to Hoffmann-La Roche, Inc.).

Preparing ketenes from heating a higher monocarboxylic fatty acid with acetic anhydride. No. 2,465,337. Charles J. Miller, Jr., and Ben E. Sorenson (to E. I. du Pont de Nemours & Co.).

Obtaining an ester of a fluorine-substituted orthosilicic acid by reacting a chlorofluorosilicane with a compound selected from the group consisting of saturated alcohols, saturated alkali metal alcoholates and saturated alkali metal mercaptides. No. 2,465,339. Richard S. Schreiber (to E. I. du Pont de Nemours & Co.).

Bis-trialkyl citrate sulfite. No. 2,465,391. William J. Myles (to Celanese Corp. of America).

Tetrahydro - 1 - methyl - 2,1-azathiolium-3-carboxylate. No. 2,465,461. Theodore F. Lavine (to Lankenau Hospital).

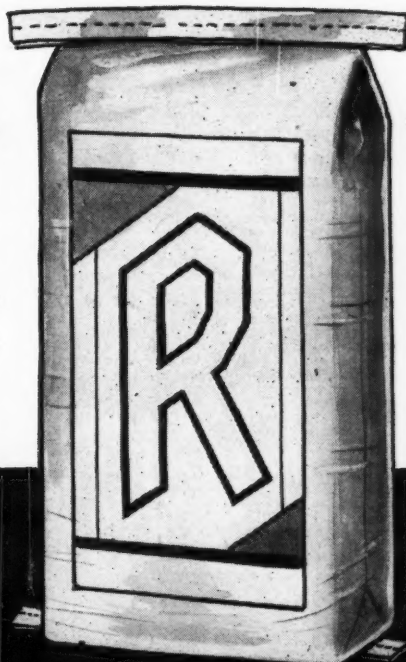
Separating a cyclic olefinic ketone from a mixture containing said cyclic olefinic ketone and an aliphatic olefinic ketone by treating with an aqueous solution of an acid-acting salt. No. 2,465,475. Herman Pines and Vladimir N. Ipatieff (to Universal Oil Prods. Co.).

Preparation of 4,4'-divinyl-biphenyl by distilling di-(α-hydroxyethyl)-biphenyl in the presence of a dehydrating agent and immediately chilling the gaseous distillate. No. 2,465,486. Fritz Rosenthal (to Radio Corp. of America).

If you ask the man who handles crushed, powdered, and granulated chemicals, he'll tell you how **RAYMOND MULTI-WALL PAPER SHIPPING SACKS** cut packing and handling time. These tough, strong, dependable Shipping Sacks are easy to stack, fast to pack,

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- Production of trioxane from formaldehyde, by heating a concentrated aqueous solution of formaldehyde that is free from methanol with sulfuric acid. Herman Sokol (to Heyden Chemical Corp.).
- Production of formaldehyde by the catalytic oxidation of methanol in contact with a silver contact catalyst. No. 2,465,498. Herbert B. Uhl and Irving H. Cooper (to Heyden Chemical Corp.).
- Manufacture of 3,4-di-(p-hydroxy-phenyl)-hexadiene-2,4 by separating 3,4-di-(p-hydroxy-phenyl)-hexandiol-3,4 into the meso and racemic forms by fractional crystallization of an ester. No. 2,465,505. Erich Adler (to Hoffmann-La Roche, Inc.).
- Hexadecamethylcyclooctasiloxane. No. 2,465,547. Rob Roy McGregor and Earl Leathen Warrick (to Corning Glass Works).
- Pyrimidine compounds. No. 2,465,568. Frederick Robert Basford, Francis Henry Swinden, Curd, Francis Leslie Rose, Harry Tacon Openshaw, Roy Hull and Alexander Robertus Todd (to Imperial Chemical Industries, Ltd.).
- Producing cumene from benzene and a gaseous fraction of hydrocarbon cracking products containing a mixture of propylene and propane. No. 2,465,610. Henry N. Short and Francis Olmsted (to Shell Development Co.).
- Isolation of styrene by azeotropic distillation with morpholines. No. 2,465,715. Karl H. Engel (to Allied Chemical and Dye Corp.).
- Isolation of styrene by azeotropic distillation with dimethylamino ethanol. No. 2,465,716. Karl H. Engel (to Allied Chemical & Dye Corp.).
- Isolation of styrene by azeotropic distillation with ethylene chlorohydrin. No. 2,465,717. Karl H. Engel (to Allied Chemical & Dye Corp.).
- Isolation of styrene by azeotropic distillation with ethylene diamine. No. 2,465,718. Karl H. Engel (to Allied Chemical & Dye Corp.).
- Producing allyl chloro silanes by heating silicon tetrachloride with allyl magnesium bromide in the presence of an anhydrous ethyl ether. No. 2,465,731. Edward L. Kropp (to American Cyanamid Co.).
- Condensation product of lecithin and an incompletely neutralized metal salt of a phosphorylated inositol. No. 2,465,733. Irene Becker Lewis.
- Salts of gamma-hydroxy-N-butyl taurine. No. 2,465,737. Gustav J. Martin and Harold Urist (to National Drug Co.).
- Pantoyl-sulfanilamide derivatives. No. 2,465,765. Harold Urist and Gustav J. Martin (to National Drug Co.).
- Preparing allyl lactates by mixing an aliphatic alcohol, lactic acid and sulfuric acid. No. 2,465,772. Samuel M. Weisberg and Edwin G. Stimpson, Alfred L. Miller (to National Dairy Research Labs., Inc.).
- Nitration product of dehydrated pentaerythritol of the general formula, $[(C_2H_5)(NO_2)O]_x$, in which X represents an integral number within the range 1 to 7. No. 2,465,776. Joseph A. Wyler (to Trojan Powder Co.).
- Beta-nitroalkane sulfonic acids. No. 2,465,803. Royden Lewis Heath and Henry Alfred Piggett (to Imperial Chemical Industries, Ltd.).
- Preparing chlorovinyl dichlorosulfone which comprises reacting a mixture of acetylene and arsenic trichloride with an aqueous solution of a mercuric chloride catalyst and a promoter selected from the group consisting of antimony trichloride, antimony pentachloride, cadmium chloride, zinc chloride, stannic chloride, and ferric chloride. No. 2,465,834. Paul D. Bartlett, Hym Joseph Dauben, Jr., and Leonard J. Rosen.
- 2-(p-methoxybenzyl, dimethylaminoethyl) aminopyrimidine and its hydrochloride. No. 2,465,865. Harris L. Friedman and Alexander V. Tolstoukhov (to Cridium Corp.).
- A 5'-(acridyl-(9))-amino-pyrimidine. No. 2,465,868. Alan August Goldberg, William Kelly, and Harold Silas Turner (to Bard, Blenkinsop & Co., Ltd.).
- Production of a dyestuff intermediate which comprises treating a cyclohexane 1:3-dione with a mercaptan taken from the group consisting of alkyl, aryl and aralkyl mercaptans in the presence of a strong acid. No. 2,465,882. John David Kendall and Frank Peter Doyle (to Ilford, Ltd.).
- Manufacture of acyloxy-carboxylic acids and salts by causing an alkali metal salt of an α -monohydroxy-monocarboxylic acid of the lower fatty series to react with a carboxylic acid containing not more than 7 carbon atoms. No. 2,465,892. Ritchie Hart Lock and Leonard Harold Adcock (to Howards & Sons, Ltd.).
- Fluorinated dialkylbenzenes. No. 2,465,900. Earl T. McBee and Ogden R. Pierce (to Purdue Research Foundation).
- Polyalkylated monochloro cyclic sulfones. No. 2,465,912. Rupert C. Morris and John L. Van Winkle (to Shell Development Co.).
- Manufacture of para-nitrobenzene sulfonyl chloride which comprises reacting dipara-nitrophenyl disulfide with a mixture of aqueous nitric and hydrochloric acids in the presence of a solvent for para-nitrobenzene sulfonyl chloride. No. 2,465,951. Michael Witte (to Allied Chemical & Dye Corp.).
- Manufacture of para-nitrobenzene sulfonyl chloride, which comprises reacting di-para-nitrophenyl disulfide with a mixture of aqueous nitric acid, chloric acid, and a solvent for para-nitrobenzene sulfonyl chloride. No. 2,465,952. Michael Witte and Morton G. Welge (to Allied Chemical & Dye Corp.).
- Nitro amines. No. 2,465,958. M. Senkus (to Commercial Solvent Corp.).
- Recovery of nitromethane from aqueous alcoholic mixtures thereof. No. 2,465,959. John B. Tindall (to Commercial Solvents Corp.).
- Preparation of an organic dinitrohydrocarbon in which the nitro groups are on adjacent carbon atoms, by contacting a lower molecular weight mononitrohydrocarbon having a replaceable hydrogen atom on the carbon atom to which the nitro group is attached, with an oxidizing agent selected from the class consisting of air, oxygen, hydrogen peroxide, organic peroxides and ozone, in the presence of an alkaline catalyst. No. 2,465,974. Clarence S. Coe, Edward C. Attane, and Thomas F. Doumani (to Union Oil Co. of Calif.).
- N-substituted amides of 2-hydroxy-3-naphthoic acids. No. 2,465,979. Henry Philip Orem and Frederic Henry Adams and John Paul Goulding (to American Cyanamid Co.).
- Production of cycloalkyl nitriles by dissolving a minor proportion of nitrogen tetroxide in a cycloalkane. No. 2,465,984. Thomas F. Doumani, Clarence S. Coe and Edward C. Attane, Jr. (to Union Oil Co. of Calif.).
- Canadian**
- Para-amino-para'-hydroxy diphenyl sulphone. No. 454,936. George W. Raiziss and LeRoy W. Clemence (to Abbott Labs.).
- Making salts of a carboxy polymethylene guanamines by dissolving a biguanide and a salt of a half ester of a saturated dibasic acid in a common solvent whereby reaction between the components is instituted and a precipitate formed. No. 454,942. Jack Theo, Thurston (to American Cyanamid Co.).
- O-N-octylcarbamylbenzozoguanamine. No. 454,943. Jack Theo Thurston and Daniel Elmer Nagy (to American Cyanamid Co.).
- Preparing N-2-cyanoethylphthalimide by heating phthalimide acrylonitrile and catalytic amounts of a water-soluble alkali-metal compound. No. 454,944. Paul P. McClellan and John H. Fletcher (to American Cyanamid Co.).
- Oxidation of aldehydes and ketones in the liquid phase by oxygen. No. 494,988. Alec Elice and Karl Heinrich Walter Tuerck and Herbert Muggleton Stanley (to Distillers Co., Ltd.).
- Production of dialkylaminoalkyl alpha-naphthyl-alpha-phenyl-acetates and salts by condensing an omega-dialkylaminoalkyl halide with an alpha-naphthyl-alpha-alkyl or alpha-naphthyl-alpha-phenyl-acetic acid. No. 455,074. Frederick F. Blicke (to Regents of University of Michigan).
- Making guanyl urea sulphamate by hydrolyzing dicyandiamide in the presence of sulphamic acid and water. No. 455,288. William H. Hill (to American Cyanamid Co.).
- Salt of α -cyanoguanidiodithiocarbamic acid. No. 455,289. Jack T. Thurston and Donald W. Kaiser (to American Cyanamid Co.).
- 2-methyl-3,4-trimethylene-benzothiazolium iodide. No. 455,308. Leslie G. S. Brooker and Homer W. J. Cressman (to Canadian Kodak Co., Ltd.).
- Reacting hydrogen with lead salts of mixed fatty acids whereby reaction products of the group consisting of alcohols corresponding to said fatty acids and esters of said alcohols are formed. No. 455,372. Albert S. Richardson and James E. Taylor (to Procter & Gamble Co., U.S.A., and Procter & Gamble Co. of Canada, Ltd.).
- Forming benzyl alcohol by reacting hydrogen with a metallic benzoate. No. 455,373. Albert S. Richardson and James E. Taylor (to Procter & Gamble Co., U.S.A., and Procter & Gamble Co. of Canada, Ltd.).
- Forming fatty alcohols by subjecting to reaction with hydrogen a mixture of soaps of fatty acids corresponding to said alcohols, comprising essentially soaps of cadmium and of at least one metal selected from the group consisting of chromium and copper. No. 455,374. Albert S. Richardson and James E. Taylor (to Procter & Gamble Co., U.S.A., and Procter & Gamble Co. of Canada, Ltd.).
- Forming higher alcohols by subjecting to reaction with hydrogen, soaps of fatty acids corresponding to said alcohols, said mixture of soaps comprising essentially soaps of zinc and of chromium. No. 455,375. Albert S. Richardson and James E. Taylor (to Procter & Gamble Co., U.S.A., and Procter & Gamble Co. of Canada, Ltd.).
- Flowing hydrogen and metallic carboxylates into a reaction chamber, the metallic constituent of said carboxylates comprising a substantial proportion of a metal selected from the group consisting of lead, cadmium, and copper to effect reduction of the carboxylic group to the group, $-CH_2-O-$. No. 455,376. Albert S. Richardson and James E. Taylor (to Procter & Gamble Co., U.S.A., and Procter & Gamble Co. of Canada, Ltd.).
- Flowing hydrogen and a salt of an unsaturated carboxylic acid and of a metal selected from the group consisting of lead and cadmium, into a reaction chamber, without added catalyst to effect reduction of the carboxylic group with resulting formation of a reaction product of the class consisting of unsaturated primary alcohol and ester thereof. No. 455,377. Albert S. Richardson and James E. Taylor (to Procter & Gamble Co., U.S.A., and Procter & Gamble Co. of Canada, Ltd.).
- Manufacture of carbon black. No. 455,503. William B. Wiegand and Harold A. Braendle (to Columbian Carbon Co.).
- Carbon black. No. 455,504. William B. Wiegand and Harold A. Braendle (to Columbian Carbon Co.).
- Manufacture of carbon black. No. 455,505. William B. Wiegand and Harold A. Braendle (to Columbian Carbon Co.).
- Producing nitroparaffins by reacting in vapour phase nitric acid and at least one paraffin by mixing vaporized nitric acid with said paraffin and passing the mixed gases through a heated catalyst chamber packed with a catalyst selected from the group consisting of the compounds of arsenic and antimony. No. 455,526. Norman Levy (to Canadian Industries Ltd.).
- Stabilization of organic halogen compounds with a triphenyl methyl ester. No. 455,527. James Robertson Myles and Winifred Jane Levy (to Canadian Industries Ltd.).
- Production of 1,5-pentadiene by 2,3-dihydropyran in the presence of a copper-containing hydrogenating catalyst. No. 455,528. John George Mackay Bremner and Frederick Starkey (to Canadian Industries Ltd.).
- Production of 1:5 pentadiene by treating 8-hydroxyvaleric aldehyde with hydrogen in the presence of a hydrogenating catalyst. No. 455,529. John George Mackay Bremner, Robert Holroyd Stanley, Arthur William Charles Taylor and Dennis Albert Dowden (to Imperial Chemical Industries Ltd.).
- Separating β -nitroethanol and β -nitroethyl nitrate from the reaction product of ethylene and nitrogen tetroxide by mixing with water, and allowing the mixture to separate into an aqueous layer containing β -nitroethanol and a non-aqueous layer containing β -nitroethyl nitrate. No. 455,530. Arthur Ernest Wilder Smith, Robert Holroyd Stanley and Charles William Scaife (to Imperial Chemical Industries Ltd.).
- In the synthesis of riboflavin, the step which comprises reducing 3,4-dimethyl, 6-arylazophenyl-d-isorabiosamine to 3,4-dimethyl, 6-amino-phenyl-d-ribamine by the action of a reducing agent selected from the group consisting of (1) sodium amalgam and (2) hydrogen in presence of a hydrogenation catalyst. No. 455,543. Jonas Kamlet (to Miles Laboratories, Inc.).
- Producing carbon black. No. 455,554. Joseph C. Krejci (to Phillips Petroleum Co.).
- Producing carbon black. No. 455,555. Joseph C. Krejci (to Phillips Petroleum Co.).
- Manufacture of isalloxazine derivatives by heating 2-(d-ribitylamino)-4:5-dimethylazobenzene with a reduction product of alloxan. No. 455,561. Franz Bergel, Aaron Cohen and John Wynne Haworth (to Roche Products Ltd.).
- Paper and Pulp**
- In recovery of lignin from black liquor concentrating the liquor to the point at which the saponified resins salt out, allowing such soaps to separate and removing same, passing carbon dioxide-containing gas through an absorption tower countercurrent to said liquor carbonate the liquor whereby precipitation of the lignin and other solids is avoided, removing the thus carbonated liquor and coagulating and precipitating the lignin by heating. No. 2,464,828. Arthur Pollak, John J. Keilen, Jr., and Lewis F. Drum (to West Virginia Pulp and Paper Co.).
- Bleached mechanical wood pulp by treating the pulp with a solution of a hypochlorite and thereafter with an alkaline peroxide solution. No. 2,465,327. Robert L. McEwen (to Buffalo Electro-Chemical Co., Inc.).
- Bleaching fibers of ground wood by moistening the fibers with an alkaline peroxide bleaching solution. No. 2,465,738. Robert L. McEwen (to Buffalo Electro-Chemical Co., Inc.).
- Petroleum**
- Conversion of normal butane to isobutane by passing a gaseous stream containing a small amount of catalyst at a large amount of hydrogen chloride through a bed of solid aluminum chloride. No. 2,464,201. John W. Latchum, Jr. (to Phillips Petroleum Co.).
- Catalytic transformation of hydrocarbons to produce high anti-knock motor fuels by the action of a catalyst obtained from a base exchange body consisting of composited silica, alumina and beryllia which has been treated with a volatile cation-containing base exchanging solution.

and heated to drive off the volatile cation. No. 2,464,205. John R. Bates (to Houdry Process Corp.).

Pyrolytic conversion of hydrocarbons. No. 2,464,257. Harry Louis Pelzer and Kenneth Merle Watson (to Sinclair Refining Co.).

Pyrolytic conversion of hydrocarbons. No. 2,464,266. Edwin William Shand (to Sinclair Refining Co.).

Coal liquefaction by hydrogenation in the presence of tin sulfide and iodide. No. 2,464,271. Henry H. Storch and Lester L. Hirst (to U.S.A. as represented by the Secretary of the Interior).

Stabilization of cracked gasoline by the product formed by the reductive alkylation of para-phenylene diamine with an aliphatic unsaturated ketone. No. 2,464,291. Joseph A. Chenicek (to Universal Oil Products Co.).

Recovery of aromatic hydrocarbons from a liquid hydrocarbon mixture by contacting with silica gel. No. 2,464,311. William G. Hiatt and Cary R. Wagner (to Phillips Petroleum Co.).

In the reaction of carbon monoxide and hydrogen to produce hydrocarbons the improvement which comprises adding alkali metal compound to increase selectivity to the catalyst after a period of use. No. 2,464,480. Roland A. Beck and Eugene E. Sensel and Alfred J. Millendorf (to Texas Co.).

Continuous cyclic process for hydrocarbon conversion. No. 2,464,489. John A. Crowley, Jr. (to Socony-Vacuum Oil Co., Inc.).

Catalytic synthesis of hydrocarbons from hydrogen and carbon monoxide. James H. Grahame (to Texas Co.).

Synthesizing hydrocarbons by suspending a powdered iron catalyst in a flowing stream of a reaction mixture of hydrogen and carbon monoxide. No. 2,464,505. Charles E. Hemminger (to Standard Oil Development Co.).

Desulfurizing an aromatic hydrocarbon containing thiophene by contacting with anhydrous liquid hydrogen fluoride whereby thiophene is converted to a resin. No. 2,464,520. Arthur P. Lien and Bernard L. Evering (to Standard Oil Co.).

Catalytic synthesis of hydrocarbons from hydrogen and carbon monoxide. No. 2,464,532. Frederick Burton Sellers (to Texaco Development Corp.).

Two-stage destructive hydrogenation of petroleum in the presence of a catalyst selected from the class consisting of sulfides and oxides of group VI and group VIII metals of the periodic system supported on a normally solid siliceous material which promotes cracking. No. 2,464,539. Alexis Voorhies, Jr., and Edward T. Marshall (to Standard Oil Development Co.).

Removal of mercaptans from petroleum distillates with an aqueous alkaline reagent containing lignin. No. 2,464,576. Robert R. Hibbard and Franklin Veatch (to Standard Oil Co.).

Catalytic hydrocarbon conversions. No. 2,464,616. Eugene F. Schwarzenbek and Joseph W. Moorman (to M. W. Kellogg Co.).

Recovery of aluminum halide from aluminum halide-hydrocarbon complex. No. 2,464,682. Harold J. Hepp (to Phillips Petroleum Co.).

Separating alkyl benzenes having nine carbon atoms from other alkyl benzenes and non-aromatic materials by fractional distillation, nuclearly halogenating to introduce one halogen atom into each of the nuclei of the alkyl benzenes having nine carbon atoms, and fractionating said halogenated fraction to obtain alkyl halo-benzene compounds having nine carbon atoms. No. 2,464,769. Orland M. Reiff and Alexander M. Moore (to Socony-Vacuum Oil Co., Inc.).

Conversion of hydrocarbon oil of low hydrogen content in solvent in contact with a hot catalyst. No. 2,464,810. Joel H. Hirsch and Kenneth E. Cody (to Foster Wheeler Corp.).

Purifying a naphthene hydrocarbon from a paraffin hydrocarbon by silica gel, thereby selectively adsorbing the paraffin. No. 2,464,931. Alfred E. Hirschler (to Sun Oil Co.).

Process for catalytic dehydrogenation C₈-C₉ paraffin and olefin hydrocarbon. No. 2,465,016. Frederick E. Frey (to Phillips Petroleum Co.).

Azeotropic distillation of C₄ acetylenes from butene-2. No. 2,465,047. James W. Tooke and Erstine Z. Lang, Jr. (to Phillips Petroleum Co.).

Alkylation of hydrocarbons in the presence of a concentrated sulfuric acid catalyst. No. 2,465,049. I. Louis Wolk (to Phillips Petroleum Co.).

Hydrocarbon conversion process. No. 2,465,255. Joseph W. Moorman (to M. W. Kellogg Co.).

Ferro-ferric oxide-alkali metal trioxalato ferrate catalyst for use in a Fischer-Tropsch synthesis. No. 2,465,279. James C. Schiller (to Standard Oil Development Co.).

Alpha iron oxide-alkali metal trioxalato ferrate catalyst for use in a Fischer-Tropsch synthesis. No. 2,465,280. James C. Schiller (to Standard Oil Development Co.).

Gamma-iron oxide-alkali metal trioxalato ferrate catalyst for use in a Fischer-Tropsch synthesis. No. 2,465,281. James C. Schiller (to Standard Oil Development Co.).

Alkali metal-trioxalato ferrate catalyst for use in a Fischer-Tropsch synthesis. No. 2,465,282. James C. Schiller (to Standard Oil Development Co.).

Alpha iron oxide-alkali metal pyroantimonate catalyst for use in a Fischer-Tropsch synthesis. No. 2,465,313. Max A. Mosesman (to Standard Oil Development Co.).

Gamma iron oxide-alkali metal pyroantimonate catalyst for use in a Fischer-Tropsch synthesis. No. 2,465,314. Max A. Mosesman (to Standard Oil Development Co.).

Ferro-ferric oxide-alkali metal pyroantimonate catalyst for use in a Fischer-Tropsch synthesis. No. 2,465,315. Max A. Mosesman (to Standard Oil Development Co.).

Catalytic synthesis of hydrocarbons by catalytic reduction of carbon monoxide with hydrogen. No. 2,465,462. Edwin T. Laying (to Hydrocarbon Research, Inc.).

Removing sulfur compounds from a sulfur-containing cracked distillate. No. 2,465,964. Lloyd F. Brooke, Melvin M. Holm and Laverne P. Elliott (to Calif. Research Corp.).

Canadian

Drilling fluid comprising an aqueous suspension of clay and containing water-soluble crystalline sodium metaphosphate, and a water-soluble potassium compound. No. 455,017. Gerald B. Tjoflat (to Hall Labs., Inc.).

Producing alkylated aromatics by contacting an olefin with a solution of an aromatic hydrocarbon having an aluminum halide dissolved therein with the aid of a small amount of nitroparaffin solvent. No. 455,405. Louis Schmerling (to Universal Oil Prods. Co.).

Converting aliphatic mono-olefins having less than six carbon atoms into diolefins by subjecting under dehydrogenating conditions to the action of a solid catalyst comprising a compound of a metal from the left hand column of Group VI of the Periodic Table and selected from the class consisting of chromium, molybdenum, tungsten and uranium. No. 455,406. Aristid V. Grosse (to Universal Oil Prods. Co.).

Separation of an unsaturated hydrocarbon from a hydrocarbon mixture by contacting with a separating agent comprising a silver salt solution in an acid of phosphorus. No. 455,407. Bernard S. Friedman and Vladimir Haensel and Russel F. Stedman (to Universal Oil Prods. Co.).

Demethylating aliphatic hydrocarbons to produce paraffins. No. 455,408. Vladimir Haensel and Vladimir N. Ipatieff (to Universal Oil Products Co.).

Extracting an aromatic hydrocarbon from a mixture containing other hydrocarbons but relatively free of olefins by contacting with a solvent for the aromatic hydrocarbon comprising sulphuric acid having dissolved therein a silver compound selected from the group consisting of silver sulphate, silver oxide and silver carbonate. No. 455,409. Bernard S. Friedman (to Universal Oil Products Co.).

Separation of cycloparaffins comprising methylcyclopentane from a hydrocarbon mixture containing said cycloparaffins in admixture with open chain paraffins. No. 455,565. William E. Ross and Philip Pezzaglia (to Shell Development Co.).

Converting normally gaseous hydrocarbons into liquid products of high antiknock value. No. 455,576. Joseph Eugene Westenberg (to Universal Oil Products Co.).

Dehydrogenation of hydrocarbons having 6 to 12 carbon atoms to the molecule by contact with a metal oxide dehydrogenating catalyst. No. 455,577. William J. Mattox (to Universal Oil Products Co.).

Producing volatile hydrocarbons from hydrocarbonaceous solids. No. 455,578. Roland B. Day (to Universal Oil Products Co.).

Photographic

Dye-sensitized photographic silver halid emulsion. No. 2,464,780. Alfred W. Anish (to General Aniline & Film Corp.).

Hydrophilic polycarbonamide photographic silver salt layers. No. 2,465,109. David Malcolm McQueen and Clay Weaver (to E. I. du Pont de Nemours & Co.).

Tetrazolyl disulfides as stabilizing agents for silver-halide emulsions. No. 2,465,149. Fritz Dersch and Robert H. Clark (to General Aniline & Film Corp.).

Light-sensitive diazotize material which comprises a diazo compound, a coupler, and an ascorbic acid. No. 2,465,424. Carl Botkin and Sam Charles Slikin (to General Aniline & Film Corp.).

Diazotize photoprinting materials comprising a light sensitive diazo sulfone. No. 2,465,760. Joseph A. Sprung and Willy A. Schmidt (to General Aniline & Film Corp.).

Canadian

Photographic material comprising a base and a light-sensitive silver-halide emulsion containing fog inhibiting amount compound. No. 455,011. Newton Heimback and Walter Kelly, Jr. (to General Aniline & Film Corp.).

Anti-static photographic film and an anti-static layer comprising di-o-tolyl guanidinium oleate. No. 455,516. Fritz W. H. Mueller (to General Aniline & Film Corp.).

Photographic developer containing a primary aromatic amino developing agent and as a colour former N-4-anthranyl succinic acid. No. 455,517. Willy A. Schmidt, Vsevolod Tulagin and Max E. Chiddix (to General Aniline & Film Corp.).

Stabilizer for photographic emulsions. No. 455,518. Newton Heimback (to General Aniline & Film Corp.).

Polymers

As molding composition, a polyvinyl chloride resin and asphaltic material and oils and waxes. No. 2,464,219. Philip C. Doyle and Kenneth H. Rudd (to Standard Oil Co.).

Preparing pentamethylene silicone polymers. No. 2,464,231. Joseph M. Hersh (to Continental Oil Co.).

Polymeric vinylidene chloride containing a light stabilizer. No. 2,464,250. Harold W. Moll and Edgar C. Britton (to Dow Chemical Company).

Molding composition comprising a polyvinyl resin selected from the group consisting of polyvinyl chloride resins and polyvinyl chloride-acetate copolymer resins and a cracked residuum comprising a major portion of components resulting from the thermal cracking of a petroleum distillate fraction. No. 2,464,263. Kenneth H. Rudd (to Standard Oil Co.).

Preparation of polyvinyl alcohol by heating a polyvinyl ester in a substantially anhydrous aliphatic liquid alcoholic medium having therein an alkali metal alkyl carbonate catalyst, the alkyl constituent of which contains from 1 to 5 carbon atoms. No. 2,464,290. Griffith Bowen (to E. I. du Pont de Nemours & Co.).

Electrical insulation consisting of thermoplastic polyvinyl chloride composition in which the plasticizer is a mixture of hydrocarbon products of a condensation reaction between formaldehyde and an aromatic petroleum fraction, and an ester of phthalic acid. No. 2,464,455. Wallace Bentley MacKenzie (to Phelps Dodge Copper Products Corp.).

Copolymer of diallyl chloromaleate and butadiene-1,3. No. 2,464,488. Albert M. Clifford and James D. D'Ianni (to Wingfoot Corp.).

Polyvinyl alcohol, furfural, formaldehyde reaction product. No. 2,464,717. Charles Arthur Porter (to Resistoflex Corp.).

Polymer of allyl glycolate. No. 2,464,741. David E. Adelson and Hans Dannenberg (to Shell Development Co.).

Vinyl ether-phosgene interpolymerization products. No. 2,464,747. Frederick Grosser (to General Aniline & Film Corp.).

Allyl glycidyl mixed diether of bis-(4-hydroxyphenyl)-2,2-propane and polymers thereof. No. 2,464,753. Edward C. Shokal and Lynwood N. Whitehill (to Shell Development Co.).

Laminated structure comprising a plurality of hard acrylic resin sheets interleaved with layers of polyvinyl acetate resin bonded to said acrylic resin sheets with an intermediate film of a copolymer comprising an acrylic ester and an acrylic acid. No. 2,464,826. Harry T. Neher and La Verne N. Bauer (to Rohm & Haas Co.).

Resinous composition comprising a polyvinyl resin which is a copolymer of vinyl chloride and vinyl acetate, a plasticizer, and an anti-block agent comprising a stearic acid amide of ethylene diamine. No. 2,464,855. Fred W. Duggan and Robert P. Stambaugh (to Bakelite Corp.).

Composition which comprises a polyvinyl compound of the group consisting of polyvinyl chloride, polyvinyl acetate, and vinyl chloride-acetate copolymers, and a nondrying trimer of the group consisting of trimers of methyl amyl ketone and methyl hexyl ketone. No. 2,465,072. Bernard A. Dombrow and John J. Miskel (to Nopco Chemical Co.).

Composition which comprises a material of the group consisting of hydrogenated rubber, chlorinated rubber, rubber hydrochloride, polychloroprene and rubbery butadiene polymers; and a nondrying trimer of the group consisting of the trimers of methyl amyl ketone and methyl hexyl ketone. No. 2,465,073. Bernard A. Dombrow and John J. Miskel (to Nopco Chemical Co.).

Resinous copolymers of styrene and 2,5,2,5'-tetrachloro-4,4'-divinyl-biphenyl. No. 2,465,122. Fritz Rosenthal (to Radio Corp. of America).

Polymeric linear diphenoxo-n-alkane-4,4'-dicarboxylic esters. No. 2,465,150. James Tennant Dickson (to E. I. du Pont de Nemours & Co.).

Aqueous polyvinyl acetate emulsion containing a dichromate of a trivalent

metal. No. 2,465,295. Frank A. Strauss (to American Abrasive Metals Co.).

Laminated product embodying a low odor phenol-formaldehyde resin. No. 2,465,299. Joseph J. Wachter (to Westinghouse Electric Corp.).

Polymerization products of piperylene and its methyl homologues, and unsaturated nitriles. No. 2,465,318. Raymond B. Seymour (to Monsanto Chemical Co.).

Polymeric linear terephthalic esters. No. 2,465,319. John Rex Whinfield and James Tennant Dickson (to E. I. du Pont de Nemours & Co.).

Substantially color-stable molding composition resistant to color changes, comprising ethyl cellulose, dibutyl phthalate, refined mineral oil and, as color stabilizing agent, citric acid. No. 2,465,472. Walter D. Faist (to Celanese Corp. of America).

Polyulfide sealing putties and compounds. No. 2,465,512. Frederic M. Carasso (to Lockheed Aircraft Corp.).

Sulfur-set furfuryl alcohol resins. No. 2,465,710. John J. Clancy (to Arthur D. Little, Inc.).

Butadiene emulsion polymerization in the presence of levpimaric acid-maleic anhydride addition product esters. No. 2,465,888. Ray V. Lawrence (to U.S.A. by the Secretary of Agriculture).

Butadiene emulsion polymerization in the presence of levpimaric acid-maleic anhydride addition product. No. 2,465,901. Forrest L. McKennon and Ray V. Lawrence (to U.S.A. by the Secretary of Agriculture).

Canadian

Copolymer of vinyl chloride and acrylonitrile. No. 454,974. Leland C. Shriver and George H. Fremon (to Carbide and Carbon Chemicals Ltd.).

Dispersing a copolymer of vinyl chloride with vinyl acetate which comprises grinding a dispersant selected from group consisting of mixtures consisting of a liquid ketone and liquid hydrocarbons predominantly aromatic in structure and mixtures consisting of a liquid ketone and liquid hydrocarbons predominantly aliphatic in structure, and forming a fluid stable suspension of said copolymer in said dispersant. No. 454,975. Clayton I. Spessard (to Carbide and Carbon Chemicals, Ltd.).

Stabilization of polymeric vinyl chloride by zinc stearate and a stearate of a metal of the group consisting of the alkali metals and the alkaline earth metals. No. 455,087. Edward Cousins (to Wingfoot Corp.).

Multicellular product which is the heat-hardened product of a gelled foam of an aqueous emulsion comprising a urea-formaldehyde resin, an acrylic acid ester, and a vinyl ester of a lower aliphatic acid. No. 455,331. Lawrence Eugene Daly (to Dominion Rubber Co., Ltd.).

Processing a rubbery vinyl alkyl ether polymer by milling on rolls at a temperature from about 40°-150°C. No. 455,340. Ivy V. Runyan (to General Aniline & Film Corp.).

In the distillation of monomeric dichlorostyrene, the improvement which comprises conducting the distillation in the presence of tertiary butyl catechol. No. 455,359. Edwin R. Erickson (to Mathieson Alkali Works).

Plasticizing a high molecular weight normally hard, brittle resin containing carbon, hydrogen and oxygen or nitrogen by compound with a hydrocarbon co-polymer of a styrene and an olefin containing 4 to 8 carbon atoms. No. 455,395. David W. Young and William J. Sparks (to Standard Oil Development Co.).

Bonding of polythene compositions to surfaces by coating the surface with an adherent layer of a solid polyalkylene sulphide composition and covering with a film of polythene in the fused state. No. 455,525. Harold Marks Glass, George Crawford Tyce and Leonard Dearden Spurr (to Canadian Industries Ltd.).

Rubber

Copolymer from an open-chain 1,3-diene hydrocarbon of 4 to 5 carbon atoms, with a mixture consisting of 85% 2-methyl-1,3-pentadiene and 15% 4-methyl-1,3-pentadiene. No. 2,464,742. Eugene T. Bishop (to Shell Development Co.).

Process of rubber manufacture by polymerizing a conjugated diolefin having 4 to 6 carbon atoms. No. 2,465,363. Warren F. Faragher and James W. Harrison (to Houdry Process Corp.).

Specialties

Making a water disinfectant from glycine, diglycine hydriodide, and iodine. No. 2,464,198. Goldsmith Hall Conant, Jr., and John Carrell Morris (to U.S.A. by Secretary of War).

Method of removing an oleaginous substance from surfaces subject to the presence of water comprising contacting the oleaginous substance with a water insoluble powder consisting of particles having a surface consisting essentially of solid carbon. No. 2,464,204. Irwin Baker.

Preserving flowers and foliage by saturating with isopropyl alcohol while retaining substantially all of said original water in said specimen, then applying fused paradichlorobenzene to coat said swelled specimen while evaporating some of said isopropyl alcohol solidifying and then evaporating said original water and said isopropyl alcohol while the shape of said specimen is maintained by the solidified paradichlorobenzene. No. 2,464,512. Philip Joffe (by mesne assignments, of 50% to Sidney Joffe and 50% to Philip M. Joffe).

Welding flux consisting of lithium fluoride, magnesium fluoride, calcium fluoride, and barium fluoride. No. 2,464,925. Francis Arthur Fox and Edward Frederick Emley (to Magnesium Elektron, Ltd.).

Antioxidant composition for fatty materials comprising a vegetable carrier oil and a synergistic mixture of a tocopherol, a low molecular weight alkyl ester of gallic acid, and lecithin. No. 2,464,927. Lloyd A. Hall and Leon Lee Gershbein (to Griffith Labs., Inc.).

Incorporating a normally substantially fat-insoluble gallic acid ester in a fatty material comprising dissolving in molten lecithin and introducing the molten solution to the fatty composition. No. 2,464,928. Lloyd A. Hall (to Griffith Labs., Inc.).

Fungicidal composition comprising $\text{RO}-\text{CH}_2-\text{CH}=\text{CH}-\text{CH}_2\text{Cl}$ in which R is a radical taken from the group consisting of phenyl and chlorobenzyl phenyl. No. 2,465,061. Oliver W. Cass (to E. I. du Pont de Nemours & Co.).

Core composition consisting of sand and a binder consisting of paradichlorobenzene, and urea formaldehyde resin. No. 2,465,094. Carl E. Hartwig (to Swan-Finch Corp.).

Motor fuel consisting of a hydrocarbon normally stable against gum formation consisting of saturated aliphatic hydrocarbons and containing a lead alkyl antiknock agent which tends to form lead-containing precipitates on storage and an inhibitor selected from the class consisting of hydroxy benzoic acid and esters and salts thereof to inhibit the formation of a lead-containing precipitate during storage. No. 2,465,209. Paul L. De Verter (to Standard Oil Development Co.).

Metal chelate stabilized organic silicon compositions. No. 2,465,296. Jack Swiss (to Westinghouse Electric Corp.).

Insect repelling solid alcoholic soap gel stick containing o-dimethyl

phthalate and 2-ethyl-1,3 hexanediol. No. 2,465,470. Allen L. Omohundro, Franz M. Neumeier and Benjamin R. Zeitlin (to McKesson & Robbins, Inc.).

Woody composition of matter comprising wood bonded with a binder formed of aluminum sulphate and dicalcium phosphate. No. 2,465,645. Herbert H. Greger.

Canadian

Lubricating composition comprising a major amount of a mineral lubricating oil and a minor amount of a triamyl phosphite. No. 455,494. Vernon L. Ricketts (to Shell Development Co.) (to Canadian Industries Ltd.).

Zinc ammonium chloride galvanizing flux consisting of a mixture of sodium and potassium chlorides, and the balance zinc ammonium chloride. No. 455,511. Ernest Russel Boller, Lowell Depp Eubank and Raymond John Kepfer (to E. I. du Pont de Nemours & Co.).

Galvanizing flux for continuous strip galvanizing consisting of a mixture of sodium and potassium chlorides, and the balance ammonium chloride. No. 455,512. Ernest Russel Boller, Lowell Depp Eubank and Raymond John Kepfer (to E. I. du Pont de Nemours & Co.).

Textiles

Rendering textiles and fabrics, non-inflammable, water and mildew-proof, comprising impregnating with an aqueous solution of ammonium, pyrophosphate and of a melamine-formaldehyde condensation product, drying and incorporating thereby a water insoluble melamine pyrophosphate. No. 2,464,342. Frederick F. Pollak and Josef Fassel.

Fire-resistant organic fibrous materials containing ethylene diamine dihydrobromide. No. 2,464,360. Alexander James Wesson and Henry Charles Olpin (to Celanese Corp. of America).

Synthetic linear polycarbonamides. No. 2,464,693. William Kirk, Jr., and Richard Seyfarth Schreiber (to E. I. du Pont de Nemours & Co.).

Preparing coated fabrics by milling a composition of chlorine-2-butadiene 1,3 plastic polymer, zinc oxide, magnesium oxide, calcium carbonate, and pigments. No. 2,465,336. Robert N. MacDonald and Henry S. Rothrock (to E. I. du Pont de Nemours & Co.).

Textile treatment with alkali-mucate solutions of cellulose ethers. No. 2,465,520. Sidney M. Edelstein.

Agricultural

Composition for inhibiting the growth of pathogenic micro-organisms on living tissues which contains a mixture of caprylic acid and a salt of caprylic acid and a diluent medium. No. 2,466,663. Walter R. Russ, Charles Hoffman, Thomas R. Schweitzer and Gaston Dalby (to Ward Baking Co.).

Fungicidal nicotine salt compositions. No. 2,466,788. Charles F. Woodward, Frank L. Howard, Harry L. Keil and Leopold Weil (to U. S. A. by the Secretary of Agriculture).

Insecticidal composition containing as an essential active ingredient in solution in a hydrocarbon an omega-thiocyanate radical of two to three carbon atoms, wherein A is an alkanol radical of two to three carbon atoms, and R is a polymethylene radical of four to five carbon atoms connecting the acyloxy and thiocyanate groups. No. 2,467,235. Norman E. Searle (to E. I. du Pont de Nemours & Co.).

Fungicide containing a basic copper salt together with zinc calculated as zinc oxide and fatty acid soap. No. 2,467,491. Alexander A. Nikitin (to Tennessee Copper Co.).

Preparation of pyrethrin concentrate. No. 2,467,859. Nicholas A. Sankowsky (to Standard Oil Development Co.).

Thiazyl plant growth compositions. No. 2,468,075. David W. Jayne, Jr., Harold M. Day and Kenneth G. Nolan (to American Cyanamid Co.).

Insecticidal composition containing chloralmines. No. 2,468,592. Stephen C. Dorman (to Shell Development Co.).

Canadian

Treating seeds before planting for stimulating growth of plants germinating from the planted seeds by treating the seeds with the oxime of levulinic acid. No. 456,210. Wendell W. Moyer (to A. E. Staley Mfg. Co.).

Cellulose

Bleaching cellulosic pulp by adjusting the moisture content of the pulp, adjusting pH of the pulp within a range of 4 to 7, passing ozone through said pulp to yield a bleached pulp. No. 2,466,633. George I. Brabender and John W. Bard and James M. Daily (to James M. Daily, Francis L. Daily and Joseph F. Ryan).

Reducing viscosity of cellulose nitrate with morpholine. No. 2,467,324. Stewart B. Luce (to Monsanto Chemical Co.).

Canadian

Manufacture of stable cellulose acetate by acetylating cellulose in the presence of sulfuric acid and acetic acid by reducing the inorganic acid content by adding water and a neutralizing compound of aluminum in amount such that 4.8% of the sulfuric acid remains unneutralized, allowing the cellulose acetate to ripen to the desired acetyl content. No. 455,851. Claude George Bonard (to Canadian Celanese Ltd.).

Purifying freshly formed regenerated cellulose products, especially those having been regenerated from viscose by subjecting the products in a gel state and in contact with acid solution to an aqueous solution of an alkaline metal chlorite. No. 455,939. Russell O. Denyes (to Camille Dreyfus.).

Ceramics

Slip for the enameling of a steel article formed from a frit that includes feldspar and silica and that includes also a borax, fortified against tearing by a salt of an alkali metal, having a sulpho-cyanide. No. 2,466,043. Jacob E. Rosenberg (to Homelaya, Inc.).

Refractory mold composition, comprising lead burned magnesite containing MgO , Fe_2O_3 and SiO_2 , solid water-soluble ammonium diacid phosphate and solid water-insoluble inert material. No. 2,466,138. Eugene Wainer (to National Lead Co.).

Optical glass consisting of boric oxide, thorium oxide, lanthanum oxide, barium oxide and an oxide selected from the group consisting of calcium oxide and magnesium oxide. No. 2,466,392. Paul F. De Paolis (to Eastman Kodak Co.).

Fluoborate optical glass comprising in combined form fluorine, boron and oxygen and at least two of the metals selected from the group consisting of barium, lanthanum, titanium, thorium, and divalent lead. No. 2,466,505. Kuan-Han Sun (to Eastman Kodak Co.).

Optical glass consisting of compatible fluoride and resulting from fusion

* U. S. Patents from Vol. 621, Nos. 1, 2, 3, 4. Canadian from Apr. 5-26.

of beryllium fluoride and aluminum fluoride. No. 2,466,506. Kuan-Han Sun and Thomas E. Callar (to Eastman Kodak Co.).

Avoiding haziness in glass consisting of fluorides by adding a phosphorus pentahalide. No. 2,466,507. Kuan-Han Sun (to Eastman Kodak Co.).

Non-borate, non-phosphate, non-silicate, optical glass consisting of compatible oxides of beryllium and aluminum. No. 2,466,508. Kuan-Han Sun (to Eastman Kodak Co.).

Fluoride glass resulting from a batch containing magnesium fluoride, fluoride selected from the group consisting of the fluorides of calcium, strontium, and barium, and mixtures thereof, fluorides of lanthanum, cerium, and thorium, lead fluoride, aluminum fluoride, and beryllium fluoride. No. 2,466,509. Kuan-Han Sun (to Eastman Kodak Co.).

Optical glass having high durability against moisture attack and high resistance to devitrification, consisting of beryllium oxide, calcium oxide, lanthanum oxide and boron oxide. No. 2,466,510. Kuan-Han Sun and Thomas E. Callar (to Eastman Kodak Co.).

Heat cast refractory composed of beta alumina and magnesium spinel. No. 2,467,122. Theodore Estes Field (to Corhart Refractories Co.).

Electrically conducting refractory body comprising a sintered mixture of stannic oxide containing an oxide selected from the group consisting of the oxides of cobalt, nickel, iron, copper, silver, gold, manganese, and zinc, and .5 to 2% UO_2 . No. 2,467,144. John M. Mochel (to Corning Glass Works).

Vitreous enamel composition composed of a zirconium frit comprising, ZrO_2 , SiO_2 , BaO , Na_2O plus K_2O , Al_2O_3 , ZnO , CaO and Fe_2O_3 ; and a mill addition opacifier, the latter being a calcination product and having a composition of proportions as follows: 4 to 6 mols CaO , 0.8 to 1.2 mols CaF_2 , 3.2 to 4.8 mols BaSO_4 and 2.4 to 3.6 mols Al_2O_3 . No. 2,468,711. B. W. King, Jr. and L. C. Baumhardt (to Harshaw Chem. Co.).

Coatings

Coating composition comprising a petroleum wax, a water-insoluble metal soap, and a gel-stabilizing agent selected from the class consisting of fatty acid esters of mono- and di-anhydro-hexahydric alcohols. No. 2,466,672. Emile E. Habib and David G. Greenlie (to Dewey and Almy Chemical Co.).

Stable coating composition comprising an organic film-forming vehicle containing a cellulose derivative and a hydrous ferric-ferrous oxide pigment. No. 2,466,770. Robert T. Hucks and Roy R. Denslow (to E. I. du Pont de Nemours & Co.).

Vitreous coatings for light metals which comprise PbO , SiO_2 , Li_2O , Na_2O , K_2O and TiO_2 . No. 2,467,114. Alden J. Deyrup (to E. I. du Pont de Nemours & Co.).

Coating composition consisting of an aqueous dispersion of at least one dispersible material and the ammonium salt of a long-chain monoalkyl N-substituted amide of bicyclo [2,2,1]-5-heptene-2,3-dicarboxylic acid. No. 2,467,192. M. E. Cuperly (to E. I. du Pont de Nemours & Co.).

Pigmented coating compositions exhibiting resistance to pigment flotation. No. 2,467,858. Craig M. Sage (to General Electric Co.).

Coating composition containing polyethylacrylate and a chlorinated hydrocarbon polymer. No. 2,468,480. Charles Edward Bradley, Jr. (to R. T. Vanderbilt Co., Inc.).

Canadian

Interpolymers of styrene with polyhydric alcoholic mixed esters and of coating compositions obtained therefrom. No. 455,783. Richard H. Buckle and Ernest Booth (to Lewis Berger & Sons, Ltd.).

Coating composition comprising a solution of a soluble fatty oil-modified alkyl resin and a fusible soluble resin obtained by heat reacting, under alkaline conditions, a 1-aryl substituted guanazole with formaldehyde in the absence of an alcohol. No. 455,852. Gaetano F. D'Alenio and James W. Underwood (to Canadian General Electric Co., Ltd.).

Detergents and Surface-Active Media

Soap stabilized against discoloration and rancidity by a biguanide salt of mercaptobenzothiazole. No. 2,467,295. Elmer W. Cook (to American Cyanamid Co.).

Breaking an aqueous emulsion containing a polymer and an emulsifier having an -NH_2 group attached to an aliphatic carbon atom, by treating with an aqueous solution of an alkali-metal nitrite and an inorganic acid. No. 2,468,330. Edward L. Kropp (to American Cyanamid Co.).

Canadian

Production of dioctyl N—(beta-sodium sulfo ethyl) aspartate, which comprises reacting beta-sodium sulfo ethyl amine with dioctyl maleate. No. 456,127. Kathryn L. Lynch and Herbert J. West (to American Cyanamid Co.).

Preparation of the reaction products of primary and secondary alkylamines and carboxylic acids by reacting an excess of the alkylamine with a fatty acid having from 8-18 carbon atoms. No. 456,218. Harland H. Young and David Rubinstein (to Swift & Co.).

Dyes & Pigments

Azo-azoxy dyes. No. 2,466,245. Ernst Keller (to J. R. Geigy A. G.).

Methine dyes containing an isquinoline nucleus. No. 2,466,523. Frank L. White and Leslie G. S. Brooker (to Eastman Kodak Co.).

Printing difficulty oxidizable sulfuric ester salts of leuco vat dyestuffs of the indigoid type which comprises printing the ester salts with dichromates and an amount sufficient to obtain full development of the dye of an accelerator. No. 2,466,656. William B. Hardy and Elizabeth M. Hardy (to American Cyanamid Co.).

Vat dyestuff. No. 2,466,960. Eduard Morgeli and Walter Kern (to Ciba Ltd.).

Manufacturing a coppered stilbene dyestuff by condensing in the presence of a caustic alkali a reactant of the group consisting of 4,4'-dinitrostilbene-2,2'-disulfonic acid and the conversion products obtained by the action of caustic alkalis on 4-nitrotoluene-2-sulfonic acid, with an aminotriazole. No. 2,467,262. Arthur Howard Knight (to Imperial Chemical Industries, Ltd.).

Vat dyes. Anthraquinone acridone carbazoles in which the acridone nucleus is linked to the carbazole nucleus through an amide linkage. No. 2,467,561. Fritz Max and David I. Randall (to General Aniline & Film Corp.).

Disazo dyes. No. 2,467,621. Otto Kaiser and Ernst Reich (to Ciba Ltd.).

Chromable azo dyestuffs. No. 2,468,172. Achille Conzetti and Guido Schetty (to J. R. Geigy A. G.).

Stilbene azo dyes. No. 2,468,204. Ernst Keller (to J. R. Geigy A. G.).

Benzodioxane azo dyestuffs. No. 2,468,277. George Clifford Strouse (to Allied Chemical and Dye Corp.).

Water-insoluble azo dyestuffs. No. 2,468,457. Henry Philip Orem, Fred-eric Henry Adams and J. P. Gouldings (to American Cyanamid Co.).

Water-insoluble monoazo dye. No. 2,468,600. Hans Z. Lecher and Fred-

eric H. Adams (to American Cyanamid Co.).

Canadian

Chromable azo dyestuff. No. 455,690. Achille Conzetti and Guido Schetty (to J. R. Geigy A. G.).

Polyazo dyestuff capable of being metallized. No. 455,881. Werner Bos-sard (to J. R. Geigy A. G.).

Improvement of the tinctorial properties of pigment dyestuffs comprising grinding with active grinding agents which are readily removable by solvents and removing the grinding agents by means of aqueous solvents of the group consisting of water, dilute acids and dilute alkalis. No. 455,922. Armin Bucher (to Society of Chemical Industry in Basel).

Trisazo Dyestuff. No. 456,007. Otto Kaiser (to Ciba Ltd.).

Wool Dyestuff. No. 456,051. Oscar Knecht and Theodor Wirth (to Sandoz Ltd.).

Metallizable polyazo dyestuffs. No. 456,052. Walter Wehrli and Charles Pettitjan (to Sandoz Ltd.).

Mordant triazol dyestuff. No. 456,188. Achille Conzetti and Otto Schmid (to J. R. Geigy A. G.).

Manufacture of green pigments of the phthalocyanine series comprising heating halogenated phthalocyanines with a compound selected from the group consisting of aliphatic, alicyclic and aromatic mercapto compounds in the presence of an alcohol and of an acid binding agent. No. 456,203. Ernst Gutzwiller (to Sandoz Ltd.).

Copper-containing azo dyestuff. No. 456,204. Walter Wehrli (to Sandoz Ltd.).

Explosives

Gasless delay powder train formed of finely divided manganese titanium alloy and finely divided sulphur. No. 2,467,334. George C. Hale and David Hart.

Delay powder train formed of a mixture comprising a metal chromate and red phosphorus. No. 2,468,061. George C. Hale and David Hart.

Inorganic

Preparing catalytic contact masses from clay containing iron compounds by treating with a reagent in gaseous form reactive with iron to form acid soluble iron salts. No. 2,466,046. Hubert A. Shabaker, George Alexander Mills and Ruth C. Dennison (to Houdry Process Corp.).

Preparing catalytic contact masses from acid-activated montmorillonite clay, by subjecting the acid-activated clay to treatment with a gas reactive with iron to form acid soluble iron compounds. No. 2,466,047. Hubert A. Shabaker, George Alexander Mills and Ruth C. Dennison (to Houdry Process Corp.).

Preparing adsorptive contact masses by subjecting iron-containing clay to contact with hydrogen sulfide. No. 2,466,048. Hubert A. Shabaker, George Alexander Mills and Ruth C. Dennison (to Houdry Process Corp.).

Treating clay containing iron compounds by subjecting the clay in dry form to an atmosphere of chlorine. No. 2,466,049. Hubert A. Shabaker, George Alexander Mills and Ruth C. Dennison (to Houdry Process Corp.).

Preparing adsorptive contact masses by subjecting clay to the action of carbon disulfide. No. 2,466,052. Hubert A. Shabaker, George Alexander and Ruth C. Dennison (to Houdry Process Corp.).

Recovery of hexavalent uranium from an aqueous solution containing uranyl ions and fluoride ions, by incorporating sufficient ammonium hydroxide to precipitate a major portion of the uranium as ammonium uranate. No. 2,466,118. Arthur J. Miller and Gerald M. Armstrong (to U. S. A. by the U. S. Atomic Energy Commission).

Preparing magnesium oxychloride cement by admixing with magnesium oxide by finely divided amorphous silica obtained by cooling, in contact with an oxygen-yielding gas, gaseous silica-yielding material contained in vapor issuing from a zone wherein silica is reduced. No. 2,466,145. Leslie W. Austin and Daniel Rhodes (to Permanent Metals Corp.).

Production of sulphur trioxide by treating a normally liquid fraction derived from petroleum and containing combined sulphur to convert the combined sulphur to hydrogen sulphide by subjecting the fraction to catalytic hydrogenation. No. 2,466,336. Leslie Christopher Strang (to Anglo-Iranian Oil Co. Ltd.).

Producing a clear silica hydrosol by mixing a solution of an alkali metal silicate with an inorganic acid. No. 2,466,842. James W. Elston (to Davison Chemical Corp.).

Producing chalk by carbonating an aqueous calcium hydroxide slurry in the presence of sugar beet residue extract. No. 2,467,082. Louis C. Fleck (to Paper Patents Co.).

Preparation of zirconia gel by reacting an aqueous solution of ammonium carbonate with an aqueous solution of zirconyl chloride. No. 2,467,089. Milton M. Marisic and Edward M. Griest (to Socony-Vacuum Oil Co., Inc.).

Producing fused beryllium oxide. No. 2,467,159. Anton Schormuller and Charles E. Windecker (to Clifton Products, Inc.).

Preparation of aluminum halide catalyst. No. 2,467,162. Henry G. Schutze (to Standard Oil Development Co.).

Making a dielectric body by firing separately to vitrification titanates of barium and strontium, mixing, adding water, molding, and refiring to produce a unitary ceramic body. No. 2,467,169. Eugene Wainer (to National Lead Co.).

Producing ammonium alum crystals by reacting an aluminum silicate clay with sulfuric acid to form an acid liquor containing aluminum sulfate and ferrous sulfate, adding ammonium sulfate to form ammonium alum crystals. No. 2,467,271. Edward S. Peer (to Filtrul Corp.).

Recovering in the form of alkali metal nitrites the oxides of nitrogen by contacting with an aqueous alkali metal hydroxide absorption liquor. No. 2,467,274. James R. Shields and Herbert L. Barneby (to Blaw-Knox Co.).

Oxidizing ammonia to oxides of nitrogen by contacting ammonia and oxygen-containing gas in the presence of a catalyst consisting of an alloy of platinum and rhodium. No. 2,467,446. Colin James Smithells (to Baker & Co., Inc.).

Reactivating a used metallic dehydrofluorinating catalyst by contacting said catalyst to remove resinous deposits with substantially anhydrous fluoride. No. 2,467,484. Elmer R. Kanhofer (to Universal Oil Products Co.).

Production of metal nitrides. No. 2,467,647. Peter P. Alexander (to Metal Hydrides, Inc.).

Lanthanum silicate phosphor. No. 2,467,689. Jan Theodor Gerard Over-heek (to General Electric Co.).

Bismuth magnesium lead silicate phosphor. No. 2,467,810. James G. Cas-sanos and Keith H. Butler (to Sylvania Electric Products, Inc.).

Decomposing acid sludge. No. 2,467,855. Chester L. Read (to Standard Oil Development Co.).

* U. S. Patents from Vol. 621, Nos. 1, 2, 3, 4. Canadian from Apr. 5-26.

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

CER-A-SEAL. Liquid protective treatment or coating preparation. 442,522. Cer-a-seal Chemical Corp.

DURAND & HUGUENIN. Artificial dyestuffs and chemical products for dyeing and printing textiles. 472,318. Durand & Huguenin S. A.

TUF-LUSTRE. Compositions for wood flooring comprising blends of polishing waxes. 481,773. E. L. Bruce Co.

RELIANCE. Ready mixed marine paints. 501,280. Reliance Paint Co., Inc.

SANITEK. Soap and cleaners. 502,770. Sanitek Products Co.

MOTH-O-BLITZ SPRAYS 'EM AND SLAYS 'EM. Insecticide. 507,255. Industrial Management Corp.

STELLAS STRETCH ALL. Liquid preparation for softening and stretching leather. 508,301. F. P. Stella & Sons Prods.

CLEARINSE. Powdered cleanser. 508,302. Purex Corp. Ltd.

DE-ROACHER. Liquid insecticide. 508,683. J. W. Quinn Drug Co.

HOZREWASH. Cold water liquid cleansing agent. 508,848. Hoz Re-Rye Co.

RUBBER-HYDE. Rubber base paints. 508,849. W. & W. Auto Finishers, Inc.

MITE-Y-FUME. Fumigants. 508,859. Andrew Wilson, Inc.

GERM-X. Disinfectants and deodorants in liquid form. 509,180. Pur-O-Zone Chemical Co.

ANTI-DAMP. Fungicides. 509,181. Andrew Wilson, Inc.

MASONITE. Hemicellulose extract. 512,682. Masonite Corp.

OPEX SYN-SPOT. Paints in dry, paste, or ready-mixed form and lacquers. 512,712. Sherwin-Williams Co.

(SYMBOL). Ready mixed liquid paint, paint enamel and paint thinner. 514,973. Master Mechanics Co.

DOHRMA-SEAL. Oil-based, flexible, waterproof prime coat. 518,088. Dohrmann Products Distributors.

AVERTEX. Rust resistant paint. 519,788. H. Kirk White and Co.

PENTACITE. Soluble synthetic resins which contain pentaerythritol. 520,417. Reichhold Chemicals, Inc.

PERMA-WRITE. Writing ink. 520,825. National Stationers.

TIDECO. Chemicals, colors and fillers. 520,911. Tidewater Chemical Co., Inc.

RPM. Oils especially prepared by admixture of chemicals and used as a hydraulic media. 520,979. Standard Oil Co. of Calif.

PROTACOTE. Paint composed of certain vinyl resins. 522,233. Charles F. Brown.

PICTONE. Photographic developer. 522,518. Mallinckrodt Chemical Works.

HANDIE CREME. Waterless cleaner for hands and painted surfaces. 523,071. E. J. Hemphill Co.

FLAME-SEAL THE PAINT THAT SAVES LIVES. Paint in liquid form which is resistant to the effects of heat. 524,257. Stallton Chemical Corp.

HALOWAX. Plasticizer for synthetic and natural resins. 524,835. Union Carbide and Carbon Corp.

X-CELL-ALL. Liquid paint remover. 526,705. National Chemical & Mfg. Co.

(SYMBOL). Tannin extracts and liquid caustic soda. 527,203. Champion Paper & Fibre Co.

BE BE BOND. Natural and synthetic rubber cements. 527,332. B. B. Chemical Co.

DISH-KLEEN. Granular blend of alkali soap and synthetic detergent. 527,417. Fischer Industries, Inc.

LUMOLITE. Varnish stain ground color, and graining compound coating. 527,600. Minnesota Linseed Oil Paint Co.

MINNVO. Varnish oil and linseed oil. 527,603. Minnesota Linseed Oil Paint Co.

CANDENS. Ready-mixed paint. 527,619. Tnemec Co., Inc.

SANI-TROL. Composition for general use as a disinfectant, deodorant, mold and slime retardant, and germicide. 527,761. Frontier Products Co.

PAINTER GUILD. Interior paints. 527,956. Minnesota Linseed Oil Paint Co.

MY-LO-TEL. Additives for oil well drilling muds—namely, gelatinized corn starch. 528,103. Magnet Cove Barium Corp.

LUSTER-LOW. Paste and ready-mixed paints. 528,767. A. Burdall Co.

BOLDEN. Chemical wood preservatives, insecticides, fungicides, and bismuth salts. 529,983. Boldens Gruvaktiebolag.

SIFES. Paints in dry, paste, and ready-mixed form. 530,124. James B. Sipe & Co.

STAINKIL. Pigmented paint sealer. 531,388. James B. Sipe & Co.

DAI-WITE. Paint sold in liquid form. 531,829. Patek Brothers, Inc.

SONOCIDE. Varnishes and paints in liquid form containing an insecticide. 531,854. Sonoco Products Co.

SHREDSOPE. Laundry and toilet soaps. 532,531. J. R. Watkins Co.

SWP COVER THE EARTH. Insecticides, fungicides, herbicides, germicides, disinfectants, pesticides; intermediates for use in organic synthesis. 533,506. Sherwin-Williams Co.

SHELL. Diallyl phthalate monomer. 533,788. Shell Chemical Corp.

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DEODORINE. Paint thinner. 540,298. Mautz Paint & Varnish Co.

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TEGELENE. Fluid to clean and control the humidity of air. 546,233. National Air Conditioning, Inc.

EM BEE. No rubbing floor wax, liquid polish wax for use on furniture and floors, paste wax for use on furniture and floors, furniture polish. 546,308. Meyer Brothers.

RICE'S. Ready-mixed paints, enamels, oils, and varnishes. 546,443. United States Gutta Percha Paint Co.

TAKITOP. Liquid paint and varnish remover. 546,593. Monard Paint & Varnish Co.

VALLEY FORGE. Paints, varnishes, and enamels. 547,731. Herock Mfg. Co., Inc.

MARWIN. Dyestuffs. 547,742. Marwin Dyestuff Corp.

MOORMAFUME. Insecticide and mange remedy. 547,864. Moorman Mfg. Co.

SHELL. Oil sprays for vegetation for controlling insects and mites thereon, insecticide concentrates, weed killers of petroleum base containing chemical agents, white mineral oil, liquefied gas, rust preventatives of petroleum base containing chemical agents, and anti-freeze solutions. 548,114. Shell Oil Co., Inc.

"BLACK-LEAF" MOSQUITO-FUMER. Parasiticide. 548,121. Tobacco By-Products and Chemical Corp.

CORROSITE. Corrosion-resistant plastic coatings. 548,334. Corrosite Corp.

ROBERTSON. Copper powder for use in stabilizing magnesite cements. 549,000. H. H. Robertson Co.

EKC. Organic chemicals. 549,239. Eastman Kodak Co.

DAY-GLO. Inks. 549,482. Switzer Brothers, Inc.

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VITA-VAR. Synthetic adhesive compound. 554,179. Vita-Var Corp.

COLPRES 10. Resin adhesive. 555,027. Timber Engineering Co.

PV. Weed control chemicals. 555,194. F. H. Peavey & Co.

MANGASUL. Manganese sulfate for use in making agricultural mixtures. 555,977. Western Electrochemical Co.

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ENOZ. Cleaning fluid. 556,324. The Diversey Corp.

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SOLVACET. Mixture of esters and sodium alkyl aryl sulphonate used as a solvent for acetate dyestuffs. 559,978. Jacques Wolf & Co.

HI-SPEED. Valve grinding compounds. 560,251. Clever Mfg. Co.

INTERSIZE. Starch sizing conditioner. 560,625. Intersize of America, Inc.

MULTIFEX. Precipitated calcium carbonate. 561,900. Diamond Alkali Co.

NON-FER-AL. Precipitated calcium carbonate. 561,901. Diamond Alkali Co.

MARKWELL. Stencil ink, marking ink, printing ink, writing ink, and rubber-stamp ink. 561,922. Markwell Mfg. Co., Inc.

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KLOSPRA. Insecticide. 563,157. Corn States Serum Co.

THORANOL-WS. Water-soluble detergent. 563,797. Thor Chemical Co.

HOW-DEE. General purpose cleaning compound. 564,135. Lothrop Sales Co.

MODORMIX. Ready-mixed paint. 566,951. F. G. Okie, Inc.

BLOOM-O-CIDE. Germicidal and sanitizing agent for use on plants. 566,957. Stoneman Labs., Inc.

BEHRON. Adhesives. 568,093. Behr-Manning Corp.

NOGERO. Detergent and non-abrasive cleaning preparation. 568,806. Nogero Mfg. Co.

FOMOCO. Ready-mixed paints, air dry and baking enamels. 569,144. Ford Motor Co.

Trademarks reproduced and described include those appearing in Official Gazette of U. S. Patent Office, Apr. 5-26.

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**POTENTIAL AROMATICS SHORTAGE
THREATENS PLASTICS GROWTH — p. 204**

Cover: Injection molding dashboard panels

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

CER-A-SEAL. Liquid protective treatment or coating preparation. 442,522. Cer-a-seal Chemical Corp.

DURAND & HUGUENIN. Artificial dyes-stuffs and chemical products for dyeing and printing textiles. 472,318. Durand & Huguenin S. A.

TUF-LUSTRE. Compositions for wood flooring comprising blends of polishing waxes. 481,773. E. L. Bruce Co.

RELIANCE. Ready mixed marine paints. 501,280. Reliance Paint Co., Inc.

SANITEK. Soap and cleansers. 502,770. Sanitek Products Co.

MOTH-O-BLITZ SPRAYS 'EM AND SLAYS 'EM. Insecticide. 507,255. Industrial Management Corp.

STELLA'S STRETCH ALL. Liquid preparation for softening and stretching leather. 508,301. F. P. Stella & Sons Prods.

CLEARINSE. Powdered cleanser. 508,302. Purex Corp. Ltd.

DE-ROACHER. Liquid insecticide. 508,683. J. W. Quinn Drug Co.

HOZREWASH. Cold water liquid cleansing agent. 508,848. Hoz Re-Rye Co.

RUBBER-HYDE. Rubber base paints. 508,849. W & W Auto Finishers, Inc.

MITE-Y-FUME. Fumigants. 508,859. Andrew Wilson, Inc.

GERM-X. Disinfectants and deodorants in liquid form. 509,180. Pur-O-Zone Chemical Co.

ANTI-DAMP. Fungicides. 509,181. Andrew Wilson, Inc.

MASONITE. Hemicellulose extract. 512,682. Masonite Corp.

OPEX SYN-SPOT. Paints in dry, paste, or ready-mixed form and lacquers. 512,712. Sherwin-Williams Co.

(SYMBOL). Ready mixed liquid paint, paint enamel and paint thinner. 514,973. Master Mechanics Co.

DOHRMA-SEAL. Oil-based, flexible, waterproof prime coat. 518,088. Dohrmann Products Distributors.

AVERTEX. Rust resistant paint. 519,788. H. Kirk White and Co.

PENTACITE. Soluble synthetic resins which contain pentaerythritol. 520,417. Reichhold Chemicals, Inc.

PERMA-WRITE. Writing ink. 520,825. National Stationers.

TIDECO. Chemicals, colors and fillers. 520,911. Tidewater Chemical Co., Inc.

RPM. Oils especially prepared by admixture of chemicals and used as a hydraulic media. 520,979. Standard Oil Co. of Calif.

PROTACOTE. Paint composed of certain vinyl resins. 522,233. Charles F. Brown.

PICTONE. Photographic developer. 522,518. Mallinckrodt Chemical Works.

HANDIE CREME. Waterless cleanser for hands and painted surfaces. 523,071. E. J. Hemphill Co.

FLAME-SEAL THE PAINT THAT SAVES LIVES. Paint in liquid form which is resistant to the effects of heat. 524,257. Stallton Chemical Corp.

HALOWAX. Plasticizer for synthetic and natural resins. 524,835. Union Carbide and Carbon Corp.

X-CELL-ALL. Liquid paint remover. 526,705. National Chemical & Mfg. Co.

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ECODUR. Lacquers, air drying and baking paint enamels, and varnishes. 537,923. Maas & Waldstein Co.

REVOLEX. Casein paint. 538,368. Chicago Paints, Inc.

KARBALOV. Fire extinguishing chemicals. 538,393. Fry-Fyter Co.

WALCON. Varnish. 539,603. Minnesota Linseed Oil Paint Co.

DRAKE-TONE. Paints in liquid and paste form. 539,676. Drake Paint Co.

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